DON'T LOSE BECAUSE YOU DIDN'T HAVE BACKFILES….

T-SHOULD

A2: Should Is Past Tense Of Shall

The interpretation: Should refers to a future act that has not been carried out – that is, the affirmative must defend a world where the federal government enacts a policy increasing participation in a national service program that has not yet been enacted

Remo **Foresi v. The Hudson Coal Co**, SUPERIOR COURT OF PENNSYLVANIA, 106 Pa. Super. 307; 161 A. 910; 1932 Pa. Super. LEXIS 239 July 14, 19**32**

As regards the mandatory character of the rule, the word 'should' is not only an auxiliary verb, it is also the preterite of the verb, 'shall' and has for one of its meanings as defined in the Century Dictionary: "Obliged or compelled (to); would have (to); must; ought (to); used with an infinitive (without to) to express obligation, necessity or duty in connection with some act yet to be carried out." We think it clear that it is in that sense that the word 'should' is used in this rule, not merely advisory. When the judge in charging the jury tells them that, unless they find from all the evidence, beyond a reasonable doubt, that the defendant is guilty of the offense charged, they should acquit, the word 'should' is not used in an advisory sense but has the force or meaning of 'must', or 'ought to' and carries [***8] with it the sense of [*313] obligation and duty equivalent to compulsion. A natural sense of sympathy for a few unfortunate claimants who have been injured while doing something in direct violation of law must not be so indulged as to fritter away, or nullify, provisions which have been enacted to safeguard and protect the welfare of thousands who are engaged in the hazardous occupation of mining.

Violation – They don't defend future action. Instead, ____

This is a better interpretation

1. Limits – There are a huge number of past instances where the federal government has increased participation in national service programs – every new deal program, multiple drafts, creation of the corps in the topic – each of these is wildly unpredictable for the negative. AND, the abuse of unlimited topics is magnified when debating the past since we can't have generics – every case occurs in a different timeframe which means our disadvantages and case arguments have to be written to dozens of different contexts. We would literally have to have a tub for every era of American history.

2. Ground – Consensus is generally settled on historical questions which means you can choose ones where the literature is not only slanted but actually indicates such a slanted consensus. Moreover, we know past actions didn't cause nuclear wars or anything else extreme but the aff still has the opportunity to make counter-factual claims about failure to enact such programs causing nuclear war – this is a losing proposition – they will ALWAYS outweigh

A2: Should Is Past Tense Of Shall

3. Education – Debate trains us to be future policy makers, lawyers and activists. All of these require the ability to make COST-BENEFIT CALCULATIONS relying on PREDICTIVE INFORMATION to be effective. This is a skill that can only and best be taught in policy debates using the assumptions of fiat. If history is valuable and relevant it can be used as empirical examples to prove and disprove future arguments which solves all your offense

AND, Utopianism such as fiat is key to formulating realistic political strategies for future social change

Streeten in '99

(Paul, Professor Emeritus of Economics at Boston University, Development, "The Case For Being Utopian", Volume 42, Issue 2, p. 118)

First, Utopian thinking can be useful as a framework for analysis. Just as physicists assume an atmospheric vacuum for some purposes, so policy analysts can assume a political vacuum from which they can start afresh. The physicists' assumption plainly would not be useful for the design of parachutes, but can serve other purposes well. Similarly, when thinking of tomorrow's problems, Utopianism is not helpful. But for long-term strategic purposes it is essential.

Second, the Utopian vision gives a sense of direction, which can get lost in approaches that are preoccupied with the feasible. In a world that is regarded as the second-best of all feasible worlds, everything becomes a necessary constraint. All vision is lost.

Third, excessive concern with the feasible tends to reinforce the status quo. In negotiations, it strengthens the hand of those opposed to any reform. Unless the case for change can be represented in the same detail as the case for no change, it tends to be lost.

Fourth, it is sometimes the case that the conjuncture of circumstances changes quite suddenly and that the constellation of forces, unexpectedly, turns out to be favourable to even radical innovation. Unless we are prepared with a carefully worked out, detailed plan, that yesterday could have appeared utterly Utopian, the reformers will lose out by default. Only a few years ago nobody would have expected the end of communism in Central and Eastern Europe, the disappearance of the Soviet Union, the unification of Germany, the break-up of Yugoslavia, the marketization of China, the end of apartheid in South Africa. And the handshake on the White House lawn between Mr Peres and Mr Arafat.

Fifth, the Utopian reformers themselves can constitute a pressure group, countervailing the selfinterested pressures of the obstructionist groups. Ideas thought to be Utopian have become realistic at moments in history when large numbers of people support them, and those in power have to yield to their demands. The demand for ending slavery is a historical example.

It is for these five reasons that Utopians should not be discouraged from formulating their proposals and from thinking the unthinkable, unencumbered by the inhibitions and obstacles of political constraints. They should elaborate them in the same detail that the defenders of the status quo devote to its elaboration and celebration. Utopianism and idealism will then turn out to be the most realistic vision.

Topicality is a voting issue for fairness

didn't think we had cards on that did you?

A2: Should Past Tense More Grammatical

We have a grammatical interpretation – arguing what is technically more consistent is irrelevant – formal grammar is rarely used and every day ungrammatical constructions prove it doesn't spiral into the destruction of all meaning

Massive fairness issues supersede – A mangled but fair resolution would probably produce some good debates – people will find ways to stop the slide into ungrammatical hell but an interpretation the structurally wires in unfairness like theirs inherently precludes the possibility of good debates

You ain't grammatical – traditional rules governing should have been abandoned – it is just used for future obligation
American Heritage Dictionary of the English Language in '00
(4th Edition, p. 1612)

Usage Note Like the rules governing the use of shall and will on which they are based, the traditional rules governing the use of should and would are largely ignored in modern American practice. Either should or would can now be used in the first person to express conditional futurity: If I had known that, I would (or somewhat more formally, should) have answered differently. But in the second and third persons only would is used: If he had known that, he would (not should) have answered differently. Would cannot always be substituted for should, however. Should is used in all three persons in a conditional clause: if I (or you or he) should decide to go. Should is also used in all three persons to express duty or obligation (the equivalent of ought to): I (or you or he) should go. On the other hand, would is used to express volition or promise: I agreed that I would do it. Either would or should is possible as an auxiliary with like, be inclined, be glad, prefer, and related verbs: I would (or should) like to call your attention to an oversight. Here would was acceptable on all levels to a large majority of the Usage Panel in an earlier survey and is more common in American usage than should. Should have is sometimes incorrectly written should of by writers who have mistaken the source of the spoken contraction should've.

This straight up makes no sense – if the resolution was a past-tense it would have said "should have" – they should have to come up with a coherent recognizable sentence using should in the context they talk about before you accept this interpretation

didn't think we had cards on that did you?

Resource Scarcity Frontline

1. Your argument misunderstands resources – they are purely a function of human knowledge
Jerry **Taylor,** Director of Natural Resource Studies at the CATO Institute, “The Growing Abundance of Natural Resources” in “Market Liberalism: A Paradigm for the 21st Century”, 19**93**, http://cato.org/pubs/chapters/marlib21.html

Virtually every year since 1800 a book, study, report, or commission has pronounced the imminent depletion of this or that resource on the basis of indices that examine current trends and known reserves. Yet every one of those pronouncements has been not only wrong but spectacularly and embarrassingly wrong.37 More efficient technologies that require fewer resource inputs, advanced extraction and harvesting technologies that allow far greater access to resource deposits, and material substitutions that replace scarce resources with far more abundant resources are just a few of the routine advances that mark the entire march of human civilization. The fundamental flaw in the conservationist paradigm is the premise that global resources are created by nature and thus fixed and finite. Not a single material resource has ever been created by "nature." Human knowledge and technology are the resources that turn "stuff" into useful commodities. What we think of as resources are actually certain sets of capabilities. As De Gregori points "Humans are the active agent, having ideas that they use to form the environment for human purposes….Resources are not fixed and finite because they are not natural. They are a product of human ingenuity resulting from the creation of technology and science."38

2. Empirically false – resources are more abundant over time
Jerry **Taylor,** Director of Natural Resource Studies at the CATO Institute, “The Growing Abundance of Natural Resources” in “Market Liberalism: A Paradigm for the 21st Century”, 19**93**, http://cato.org/pubs/chapters/marlib21.html

Yet declining resource scarcity is a long-term trend, evident from the beginning of human society. Without exception, every material resource imaginable has become more abundant during the course of civilization. Whether measured in terms of proven reserves or prices relative to income, a graph of the relative abundance of virtually every resource looks like the population graphs we have seen so many times before: long-term, steady growth in resources with an exploding, exponential increase in resource availability over the last 200 years. The record of the last 50 years, then, is not atypical but perfectly consistent with the observable data on increasing resource availability since the beginning of time.
Another view holds that we are a world in "overshoot," living off our resource capital and not our income, irresponsibly and rapidly drawing down precious stocks of resources that have taken eons for the earth to accumulate. The authors of Beyond the Limits argue that "overshoot comes from delays in feedback-from the fact that decisionmakers in the system do not get, or believe, or act upon information that limits have been exceeded until long after they have been exceeded. Overshoot is only possible because there are accumulated resource stocks that can be drawn down.36
That argument, however, is in direct contradiction to every possible measurement of resource scarcity and the march of recorded history. If overshoot occurs when we use resources faster than they are created by nature, then the world has been in accelerating "overshoot" for the last 10,000 years, or ever since the development of agriculture. Moreover, our best "feedback" on scarcity-market prices-tells us that resources are expanding, not contracting (Table 2).

3. Resource scarcity theory under-estimates and over-emphasizes the relevance of resource reserves
Jan **Narveson**, Professor of philosophy at the University of Waterloo in Ontario, Free Inquiry, “Overpopulation? Fiddlesticks!” Volume 24, Issue 5, August/September 20**04**, Proquest

Pessimists now tell us that all these new people won't ever be able to enjoy Western standards of living. Said a United Nations committee in 1996: "Continued growth in per capita consumption to levels currently enjoyed by the developed countries for a future global population of 10-12 billion is clearly not sustainable." But they're dead wrong. There is simply no reason why all of us, including people in the poorest countries, shouldn't be able to drive a Mercedes eventually. In the future, most Chinese will likely have cars, nicer houses, and all the familiar goodies to go with them. It isn't just that the amount of iron ore in the earth's crust is vastly greater than what would be needed to make the three billion or so motor cars for equipping the world: it's that quantities of this or that have very little to do with it. We make cars out of whatever works best, and what that might be in the farther future is impossible to predict.
Those who doubt this have two problems. First, they simply don't realize how much in the way of natural resources, strictly defined, the earth contains. Second, they don't understand how little that has to do with anything. Regarding the first: the story of every material resource is that as time goes by, estimates of available quantities increase. In 1950, annual world oil consumption ran to four billion barrels, and "proven reserves" were approximately ninety billion barrels-enough for twenty-two years. In the subsequent forty-four years consumption rose to more than 640 billion barrels, yet proven reserves were ten times greater than in 1950! (The current figure is eight hundred years.) The same is true of every material resource. The earth's supply of x is good for millennia or even millions of years. What's a poor prophet of doom to do?
The other point is more basic. How many of the really nice things in your life are hugely consumptive of matter? Buildings, bridges, roads, ships, cars? They are all constructed of plentiful materials-no problem there, even if we covered the planet with them-which, of course, we will not. What about the rest? How much matter goes into a great oil painting by Van Gogh, now worth fifty million dollars? Or your computer? Or the down-filled parka that keeps us northerners comfy on the coldest winter days? Or the compact discs that store thousands of hours of beautiful listening on my shelves? Thinking about this will lead you to see that the whole idea that modern civilization is based on huge "consumption" of "natural resources" is way off base. What it "consumes" is ingenuity, talent, skill-and the neat thing about their "consumption" is that they don't get consumed. Writing the complete works of Shakespeare left Shakespeare quite intact, though it enriched the rest of us immeasurably.

Resource Scarcity Frontline

4. Resources are infinite – we'll never run out
Geddes in '04
(Marc, Writer and Libertarian Analyst, "THE MONSTER NON-SOCIALIST FAQ", February 12, http://solohq.com/War/MonsterFAQ.shtml)

Answer: A significant disruption to supplies of critical resources can cause temporary problems, but in a free market, if resources start to become scarce, prices rise, leading to a search of substitutes and improved conservation efforts. The pool of resources is not fixed, because human ingenuity can find substitutes or new sources of resources. Supplies of most raw materials have been increasing throughout the 20th century, and the cost has been falling (See the entry on Natural resources). For instance, between 1950 and 1970, bauxite (aluminium source) reserves increased by 279 per cent, copper by 179 per cent, chromite (chromium source) by 675 per cent, and tin reserves by 10 per cent. In 1973 experts predicted oil reserves stood at around 700 billion barrels, yet by 1988 total oil reserves had actually increased to 900 billion barrels.
Production of certain kinds of resources such as fossil fuels may finally be beginning to peak but there are renewable energy sources in development which can serve as substitutes. Simplistic thermodynamic analysis of energy production is misleading, because it's not the quantities of energy used or produced that determine economic value, but the utility, or usefulness if that energy to humans. If energy is being used more efficiently you don't need as much of it, and some forms of energy are more valuable than others- for instance kinetic energy in the form of wind power is less valuable than the same quantity of latent energy in the form of oil. Solar power is a virtually inexhaustible supply of new energy for stationary sources and the hydrogen fuel cell can serve for transportation in place of fossil fuels. Developing these technologies costs money, so to avoid resource shortages a good economy is essential. Libertarian capitalism is the system which generates wealth the fastest.

5. Technology will always increase resource availability
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 30-31

The most important elements in raw-material price trends have been (1) the rate of movement from richer to poorer ores and mining locations, that is, the phenomenon of "exhaustion"; and (2) the continued development of technology, which has more than made up for exhaustion.
Is the rate of development of such new technology slowing up? To the contrary: the pace of development of new technology seems to be increasing. Hence, if the past differs from the future, the bias is likely to be in the direction of understating the rate at which technology will develop, and therefore under-estimating the rate at which costs will fall.
The fall in the costs of natural resources, decade after decade and century after century, should shake us free from the idea that scarcity must increase sometime. And please notice that current prices do not mislead us about future scarcities. If there is reason to judge that the cost of obtaining a certain re-source in the future will be much greater than it is now, speculators will hoard that material to obtain the higher future price, thereby raising the present price. So current price is our best measure of both current *and* future scarcity (more about this later).

6. Price signals solve scarcity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 45-46

A second difficulty with material-technical forecasts stems from an important property of natural resource extraction. A small change in the price of a mineral generally makes a very big difference in the potential supplies that are economically available – that is, profitable to extract. Yet many forecasts based on physical principles are limited to supplies of the resource available at current prices and current technology. Given that the most promising lodes will always be mined first, this approach inevitably suggests a rapid exhaustion of "reserves" even though the long-term trend is decreasing scarcity because of the added incentive to find new lodes and invent better methods of extraction.

Resource Scarcity Frontline

6. Human ingenuity brought about by short-term scarcity creates long-term sustainability for increased consumption
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 407-408

There is no persuasive reason to believe that the relatively larger use of natural resources that would occur with a larger population would have any special deleterious effects upon the economy in the future. For the foreseeable future, even if the extrapolation of past trends is badly in error, the cost of energy is not an important consideration in evaluating the impact of population growth. Other natural resources may be treated in a manner just like any other physical capital when considering the economic effect of different rates of population growth. Depletion of mineral resources is not a special danger for the long run or the short run. Rather, the availability of mineral resources, as measured by their prices, may be expected to increase—that is, costs may be expected to decrease —despite all notions about "finiteness."
Sound appraisal of the impact of additional people upon the "scarcity" (cost) of a natural resource must take into account the feedback from in-creased demand to the discovery of new deposits, new ways of extracting the resource, and new substitutes for the resource. And we must take into ac-count the relationship between demand now and supply in various future years, rather than considering only the effect on supply now of greater or lesser demand now. And the more people there are, the more minds that are working to discover new sources and increase productivity, with raw materials as with all other goods.

7. PEOPLE CAN ALWAYS SUBSTITUTE ONE RESOURCE FOR ANOTHER; WHEN ONE COMMODITY BECOMES SCARCE, INNOVATIONS WILL ENSURE MODERATE USE OF THAT RESOURCE
KRAUTKRAEMER 2005
[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]
The ability to substitute capital for a natural resource, then, is a critical question in the current scarcity and growth debate. It is relatively easy to find examples where capital can substitute for the use of a natural resource. For example, insulation and thermal pane windows reduce the energy needed to maintain indoor temperatures. The redesign of products like milk and beverage containers that allows the same services to be obtained with less material input can be seen to substitute human capital services for plastic and aluminum. New technologies can replace one resource with another more abundant resource, as fiber optics have replaced copper for telecommunications. The mix of goods produced in the economy can shift from more to less resource intensive commodities. The energy used to produce one dollar of gross domestic product was reduced by almost one-half in the United States between 1949 and 2000, with most of that reduction coming after 1970, although total energy use tripled as population doubled and per-capita GDP increased (Energy Information Agency 2002). World primary energy use per dollar of GDP has declined by more than 25% since 1970 (Smith 2002) and at an annual rate of 1.7% during the 1990s (Darmstadter 2002). The use of materials per unit of GDP has declined about one-third since 1970 (Wernick et al. 1996).

8. PREFER OUR CARDS – EVERY DOOM FORECAST HAS BEEN WRONG – EVER
SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFIED 20**05**
[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

About pollution now: Surveys show that the public believes that our air and water have been getting more polluted in recent years. The evidence with respect to air indicates that pollutants have been declining, especially the main pollutant, particulates. (See Figure 5). With respect to water, the proportion of monitoring sites in the U.S. with water of good drinkability has increased since the data began in l96l. (Figure Every forecast of the doomsayers has turned out flat wrong. Metals, foods, and other natural resources have become more available rather than more scarce throughout the centuries. The famous Famine 1975 forecast by the Paddock brothers -- that we would see millions of famine deaths in the U.S. on television in the 1970s -- was followed instead by gluts in agricultural markets. Paul Ehrlich's primal scream about "What will we do when the [gasoline] pumps run dry?" was followed by gasoline cheaper than since the 1930's. The Great Lakes are not dead; instead they offer better sport fishing than ever. The main pollutants, especially the particulates which have killed people for years, have lessened in our cities. (Socialist countries are a different and tragic environmental stry, however!)

Extensions #1: Human Knowledge ➔ Resources

Resources are only useful with human ingenuity – this guarantees increasing supply
Jerry **Taylor**, Director of Natural Resource Studies at the CATO Institute, CATO Institute Research Articles, "The State of the World: Doom or Boom?" January 27, 19**99**, http://cato.org/research/articles/taylor-990127.html

We can tell whether resources are becoming more abundant or more scarce by examining inflation-adjusted price trends. Whether we examine timber prices, food prices, energy prices or whatever, we see falling prices indicating increasing resource abundance. Why? Because resources are not like "buried treasure" that we go out and find and then use up. Resources are simply inert "stuff" (like petroleum) that is useless until human ingenuity discovers a way to harness it for human benefit. As our knowledge base grows, our ability to discover and create resources grows with it.

There's no such thing as "natural resources" – humans only value services and we can infinitely expand the services from existing stuff
Sheldon **Richman**, Senior Editor at the CATO Institute, "The Population Problem That Isn't", July, 19**93**, http://www.fff.org/freedom/0793c.asp

This brings us to a sadly unappreciated point: there are no natural resources. Resources are not natural; they are manmade. Nature provides a variety of stuff, but it comes with no instructions on what it is good for, if it is good for anything at all. It takes a human being to invent a use for it and thus make it valuable — a resource. The Indians lived in poverty amidst an abundance of potential resources, just as the poor Arabs lived for centuries with oil and Third World peoples live today on potentially rich agricultural land. Until a mind identifies a potential and discovers how to turn it into an actual, the stuff might as well not be there.
Consider the implications: in practical terms, the supply of a resource is not finite. It is integrally dependent on human ingenuity. If we were to think of ways to double the efficiency with which we use oil, it would be equivalent to doubling the supply of oil.
There can be no more dramatic illustration of this principle than the information revolution that now swirls around us. The world is being transformed because the cost and speed of creating, manipulating, and communicating knowledge (and other forms of wealth) have fallen to tiny fractions of previous levels. What resources facilitate this revolution? Silicon, for computer chips, and glass, for fiber optic cables. Both are made from silica, which, after oxygen, is the most common element on earth. It is sand! Thus, human beings took a common, abundant material, applied their ingenuity (in the form of, for example, quantum mechanics), and created unprecedented wealth.
There are no natural resources. None. So we can't ever run out. Resources are limited by our imagination. More people and more development mean more resources. Not less.
What we value are not resources per se, but services. The voice-transmission services rendered by copper wire are now better rendered by glass threads. Thus, we are happy to leave the copper in the ground and switch to fiber optics. And if human ingenuity found a superior substitute for copper in every use, it would not matter if we "ran out" of copper (even if we could — copper is indestructible).

Extensions #2: Resources Becoming More Abundant

All long-term evidence indicates resources are becoming more abundant, not less
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 3

Are we now "in crisis" and "entering an age of scarcity"? You can see anything you like in a crystal ball. But almost without exception, the relevant data (and long-run economic trends) suggest precisely the opposite. The appropriate measures of scarcity (the costs of natural resources in human labor, and their prices relative to wages and to other goods) all suggest that natural resources have been becoming less scarce over the long run, right up to the present.

No evidence to support doomsters on any issue of scarcity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 15

To repeat, every forecast of the doomsayers has turned out flat wrong. Metals, foods, and other natural resources have become more available rather than more scarce throughout the centuries. The *Famine* 1975 forecast by the Paddock brothers that we would see famine deaths in the United States was followed by gluts in agricultural markets. After Paul Erlich's primal scream – "What will we do when the [gasoline] pump runs dry?" – gasoline became cheaper than since the 1930s. The Great Lakes are not dead; instead they offer better sport fishing than ever. The main pollutants, especially the particulates which have killed people for years, have lessened in our cities.

Empirical evidence suggests resources will become more abundant over time
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 24

Hula-Hoops and dental care and radios seem different from copper because most of the cost of a radio, a Hula-Hoop, or dental care arises from human labor and skill, and only a small part arises from the raw material—the petroleum in the plastic hoop or the silver in the tooth filling. For good reason we do not worry that human labor and skill comes from progressively less accessible reservoirs.
But all this neat theorizing about the increasing scarcity of minerals contradicts a most peculiar fact: Over the course of history, up to this very moment, copper and other minerals have been getting less scarce, rather than more scarce as the depletion theory implies they should. In this respect copper follows the same historical trend as radios, undershirts, and other consumer goods (see fig. 1-1). It is this fact that forces us to go beyond the simple theory and to think more deeply about the matter.
At the end of this confrontation between theory and fact, we shall be compelled to reject the simple Malthusian depletion theory and to offer a new theory. The revised theory will suggest that natural resources are not finite in any meaningful economic sense, mind-boggling though this assertion may be. The stocks of them are not fixed but rather are expanding through human ingenuity. There is no solid reason to believe that there will ever be a greater scarcity of these extractive resources in the long-run future than now. Rather, we can confidently expect copper and other minerals to get progressively less scarce.

Extensions #2: Resources Becoming More Abundant

History shows an increasing availability of useful resources which will continue into the future
Reisman in '80
(George, Associate Professor of Economist at Pepperdine University, The Freeman: Ideas on Liberty, "Progress In a Free Economy", July, http://www.fee.org/vnews.php?nid=854)

The record of the last centuries, certainly, demonstrates that such a society has no problem of a scarcity of accessible natural resources. While the total volume of chemical elements in the world has remained the same, the volume of useful elements and compounds at the disposal of man has been enormously increased. Today, for example, because of improved knowledge and equipment, it is probable that man can more easily extract minerals from a depth of a thousand feet than he could a century ago from a depth of fifty feet. In the same way, he has learned how to use elements and compounds he previously did not know how to use—such as aluminum and petroleum, which have only been in use for approximately a century, and, more recently, uranium. There is no reason why, under the continued existence of a free and rational society, the supply of accessible natural resources should not go on growing as rapidly as in the past or even more rapidly. Further advances in mining technology, for example, that would make it possible to mine economically at a depth of, say, ten thousand feet, instead of the present limited depths, would so increase the portion of the earth's mass accessible to man, that all previous supplies of accessible minerals would appear insignificant by com parison. And even at ten thousand feet, man would still, quite literally, just be scratching the surface, because the radius of the earth extends to a depth of four thousand miles. In the same way, dramatic advances are possible in the field of energy, such as may occur through the use of atomic energy, hydrogen fusion, solar power, tidal power, or thermal power from the earth's core, or still other processes as yet unknown.

PRICE IS THE MOST ACCURATE INDICATOR OF SCARCITY; TECHNOLOGY HAS INCREASED RESOURCES BEYOND ANY FIXITY
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, 19**95**
[SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

The initially plausible claim that more people deplete resources faster has no more foundation than the catastrophists' other arguments. Price is the best indication of relative scarcity. For centuries, resources of every kind, including energy, have been getting cheaper. In 1990 energy on average was 46 percent cheaper that it was in 1950; minerals were 48 percent cheaper, lumber 41 percent cheaper, food 74 percent cheaper. As Carroll Ann Hodges, of the U.S. Geological Survey, wrote in the June 2, 1995, issue of Science (pp. 1305-1312), "Yet, despite the specter of scarcity that has prevailed throughout much of this century, no sustained mineral shortages have occurred. . . .Minerals essential to industrial economies are not now in short supply, nor are they likely to be for the next several generations." (The only thing getting more expensive is labor, an indication of the scarcity of people.) Technology enables us to find more resources and to use them more efficiently. Doubling the efficiency of our use of oil would be equivalent to doubling the available supply of oil. Natural resources, in other words, do not exist in fixed supplies.

Extensions #4: Resources Infinite

Resources are infinite – no risk of shortage
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 6

Natural resources. Hold your hat—our supplies of natural resources are not finite in any economic sense. Nor does past experience give reason to expect natural resources to become more scarce. Rather, if history is any guide, natural resources will progressively become less costly, hence less scarce, and will constitute a smaller proportion of our expenses in future years. Population growth is likely to have a long-run beneficial impact on the natural-resource situation.

Natural resources are infinite – their capacity is that of the earth's mass itself
Reisman in' 01
(George, Associate Professor of Economics at Pepperdine University, "Environmentalism Refuted", April 20, http://www.mises.org/story/661)

We are already familiar with the fact that an outstanding characteristic of natural resources in the first sense, that is, of natural resources as provided by nature, is that none of them are intrinsically goods—that their achievement of goods-character awaits action by man. A further, equally important characteristic of natural resources as provided by nature, and which now needs to be stressed as strongly as possible, is the enormity of their quantity. Indeed, for all practical purposes, they are infinite. Strictly speaking, they are one and the same with all the matter and energy in the universe. That is the full extent of the natural resources supplied by nature.
Thus, in one sense, the sense of useable, accessible natural resources—that is, of goods as Menger defines the term—the contribution of nature is zero. Practically nothing comes to us from nature that is ready-made as a useable, accessible natural resource—as a good in Menger's sense. In another sense, however, the natural resources that come from nature—the matter, in the form of all the chemical elements, known and as yet unknown, and energy in all of its forms—are virtually infinite in their extent. In this sense, nature's contribution is boundless.
Even if we limit our horizon exclusively to the planet earth, which certainly need not be our ultimate limit, the magnitude of natural resources supplied by nature is mind-bogglingly huge. It is nothing less than the entire mass of the earth and all of the energy that goes with it, from thunder storms in the atmosphere, a single one of which discharges more energy than all of mankind produces in an entire year, to the tremendous heat found at the earth's core in millions of cubic miles of molten iron and nickel. Yes, the natural resources provided by nature in the earth alone extend from the upper limits of the earth's atmosphere, four-thousand miles straight down, to its center. This enormity consists of solidly packed chemical elements. There is not one cubic centimeter of the earth, either on its surface or anywhere below its surface, that is not some chemical element or other, or some combination of chemical elements. This is nature's contribution to the natural resources contained in this planet. It indicates the incredibly enormous extent of what is out there awaiting transformation by man into natural resources possessing goods-character.

There is no limit to resources except human knowledge
Reisman in '80
(George, Associate Professor of Economist at Pepperdine University, The Freeman: Ideas on Liberty, "Progress In a Free Economy", July, http://www.fee.org/vnews.php?nid=854)

Now because the world is composed entirely of natural resources and possesses a virtually irreducible and practically infinite supply of energy, the problem of natural re sources is simply one of being able to obtain access to them, of being able to obtain command over the resources, that is, of being in a position to direct them to the service of human well-being. This is strictly a problem of science, technology, and the productivity of labor. Its solution depends merely on learning how to break down and then put together various chemical compounds in ways that are useful to man, and having the equipment available to do it without requiring an inordinate amount of labor. Human intelligence certainly has the potential for discovering all the knowledge that is required, and in a free, rational society, the incentive of profit virtually guarantees that this knowledge will both be discovered and provided with the necessary equipment to be put to use.

We Won't Run Out of Resources
Joseph L. Bast, President and CEO of the Heartland Institute, Heartland Perspectives, "Ending the Myth of Overpopulation", July 8, 1999, http://www.heartland.org/Article.cfm?artId=629

Will we run out of natural resources such as oil, copper, or iron? Not likely. Thanks to new discoveries and improving extraction technologies, known reserves today are larger than they were in the 1960s and 1970s. Even the usually panic-stricken Worldwatch Institute concluded in 1992 that "scarcity of mineral deposits does not appear likely to constrain the production of most important minerals in the foreseeable future."

Extensions #4: Resources Infinite

No risk of running out of resources
Reisman in '80

(George, Associate Professor of Economist at Pepperdine University, The Freeman: Ideas on Liberty, "Progress in a Free Economy", July, http://www.fee.org/vnews.php?nid=854)

<Because the earth is literally nothing but an immense solid ball of useful elements and because man's intelligence and initiative in the last two centuries were relatively free to operate and had the incentive to operate, it should not be surprising that the supply of accessible minerals today vastly exceeds the supply that man is economically capable of exploiting.
In virtually every case, there are vast known deposits of minerals which are not worked, because it is not necessary to work them. Indeed, if they were worked, there would be a relative overproduction of minerals and a relative underproduction of other goods—i.e., a waste of capital and labor. In virtually every case, it is necessary to choose which deposits to exploit—namely those which by virtue of their location, amount of digging required, the degree of concentration and purity of the ore, and so forth, can be exploited at the lowest costs.
Today, enormous mineral deposits lie untouched which could be exploited with far less labor per unit of output than was true of the very best deposits exploited perhaps as recently as a generation or two ago—thanks to advances in the state of mining technology and in the quantity and quality of mining equipment available. >

No meaningful limit to resources
Reisman in '80

(George, Associate Professor of Economist at Pepperdine University, The Freeman: Ideas on Liberty, "Progress in a Free Economy", July, http://www.fee.org/vnews.php?nid=854)

<Let us consider the physical world in which man lives. Is there a limit to the supply of natural resources on earth?[1]
Yes, there is. But the limit is utterly irrelevant to human action. For practical purposes it is infinite, because the limit is the entire mass of the earth. The entire earth, from the uppermost limits of its atmosphere to its very center, four thousand miles down, consists exclusively of natural resources, of solidly packed natural resources. For what is the earth made out of?. It is made exclusively out of chemical elements found in different combinations and in different proportions in different places. For example, the earth's core is composed mainly of iron and nickel—millions of cubic miles of iron and nickel. Aluminum is found practically everywhere. Even the soil of the Sahara desert is comprised of nothing but various compounds of silicon, carbon, oxygen, hydrogen, aluminum, iron, and so on, all of them having who knows what potential uses that science may someday unlock. Nor is there a single element that does not exist in the earth in millions of times larger quantities than has ever been mined.
Now this limit of natural resources has existed from the very first day that man appeared on earth, and in all the millennia since, it has not diminished by so much as a single atom. This is because chemical elements are never destroyed. They simply reappear in different combinations, in different proportions, in different places.>

Extensions #4: Resources Infinite

Resources are limitless – this allows continual population growth to improve life quality
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 588

So to sum up the summary: In the short run, all resources are limited. An example of such a finite resource is the amount of time and attention that you will devote to what I have written. The longer run, however, is a different story. The standard of living has risen along with the size of the world's population since the beginning of recorded time. There is no convincing economic reason why these trends toward a better life should not continue indefinitely.
The key theoretical idea is this: Increased population and a higher standard of living cause actual and expected shortages, and hence price rises. A higher price represents an opportunity that attracts profit-minded entrepreneurs and socially minded inventors to seek new ways to satisfy the shortages. Some fail, at cost to themselves. A few succeed, and the final result is that we end up better off than if the original shortage problems had never arisen. That is, we need our problems, though this does n,5 .imply that we should purposely create additional problems for ourselves.

While resources aren't infinitely sustainable now they are increasingly plentiful and empirical data contradicts limited resources
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 596-597

I do not say that "infinite sustainability" is possible now or at any future moment. What I do say is that sustainability is increasing with the passage of time; there have been more and cheaper substitutes for each raw material with the passage of time.
Finiteness by itself is not testable, except insofar as the fact that no one is able to state the absolute size of the relevant system (our cosmos) demonstrates the absence of finiteness in its dictionary sense. But the relevant evidence we have available—decreasing prices and increasing substitutability—is not what one would expect from a finite system. (Hence the critics are reduced to saying that all the evidence of history is merely "temporary" and must reverse "sometime," which is the sort of statement that is outside the canon of ordinary science.)
There is no doubt that my assertion of nonfiniteness is anti-commonsensical and, indeed, mindboggling; regrettably (and contrary to what Grant and others assert) it is not explicit in standard economics, though it is not incompatible with standard received economics. But the critics simply do not come to grips with the matter that the available data are not consistent with the assumption of finiteness.

Extensions #6: Knowledge/Tech Solves Scarcity

Increased knowledge and capital will perpetually increase usable natural resources
Reisman in' 01
(George, Associate Professor of Economics at Pepperdine University, "Environmentalism Refuted", April 20, http://www.mises.org/story/661)

The key point here is that, following Menger's insights into the nature of goods, the supply of economically useable, accessible natural resources is expandable. It is enlarged as part of the same process by which man increases the production and supply of all other goods, namely, scientific and technological progress and saving and capital accumulation.
The fundamental situation is this. Nature presents the earth as an immense solidly packed ball of chemical elements. It has also provided comparably incredible amounts of energy in connection with this mass of chemical elements. If, over and against this massive contribution from nature stands motivated human intelligence—the kind of motivated human intelligence that a free, capitalist society so greatly encourages, with its prospect of earning a substantial personal fortune as the result of almost every significant advance, there can be little doubt as to the outcome: Man will succeed in progressively enlarging the fraction of nature's contribution that constitutes goods; that is, he will succeed in progressively enlarging the supply of useable, accessible natural resources.
The likelihood of his success is greatly reinforced by two closely related facts: the progressive nature of human knowledge and the progressive nature of capital accumulation in a capitalist society, which, of course, is also a rational as well as a free society. In such a society, the stock of scientific and technological knowledge grows from generation to generation, as each new generation begins with all of the accumulated knowledge acquired by previous generations and then makes its own, fresh contribution to knowledge. This fresh contribution enlarges the stock of knowledge transmitted to the next generation, which in turn then makes its own fresh contribution to knowledge, and so on, with no fixed limit to the accumulation of knowledge short of the attainment of omniscience. Similarly, in such a society the stock of capital goods grows from generation to generation. The larger stock of capital goods accumulated in any generation on the foundation of a sufficiently low degree of time preference and thus correspondingly high degree of saving and provision for the future, together with a continuing high productivity of capital goods based on the foundation of advancing scientific and technological knowledge, serves to produce not only a larger and better supply of consumers' goods but also a comparably enlarged and better supply of capital goods. That larger and better supply of capital goods, continuing on the same foundation of low time preference and advancing scientific and technological knowledge, then serves to further enlarge and improve the supply not only of consumers' goods but also of capital goods. The result is continuing capital accumulation, on the basis of which, from generation to generation, man is able to confront nature in possession of growing powers of physical command over it. On the basis of both of progressively growing knowledge of nature and progressively growing physical power over nature, man progressively enlarges the fraction of nature that constitutes goods, i.e., the supply of useable, accessible natural resources.

Human knowledge increases control and abundance of resources
Reisman in' 01
(George, Associate Professor of Economics at Pepperdine University, "Environmentalism Refuted", April 20, http://www.mises.org/story/661)

And this brings me to what I consider to be the revolutionary view of natural resources that is implied in Menger's theory of goods. Namely, not only does man create the goods- character of natural resources—by obtaining knowledge of their useful properties and then creating their useability and accessibility by virtue of establishing the necessary command over them—but he also has the ability to go on indefinitely increasing the supply of natural resources possessing goods-character. He enlarges the supply of useable, accessible natural resources—that is, natural resources possessing goods-character—as he expands his knowledge of and physical power over nature.
The prevailing view, that dominates the thinking of the environmentalists and the conservationists, that there is a scarce, precious stock of natural resources that man's productive activity serves merely to deplete is wrong. Seen in its full context, man's productive activity serves to enlarge the supply of useable, accessible natural resources by converting a larger, though still tiny, fraction of nature into natural resources possessing goods-character. The essential question concerning natural resources is what fraction of the virtual infinity that is nature does man possess sufficient knowledge concerning and sufficient physical command over to be able to direct it to the satisfaction of his needs. This fraction will always be very small indeed and will always be capable of vastly greater further enlargement.

Extensions #6: Knowledge/Tech Solves Scarcity

EMPIRICALLY TECHNOLOGICAL DEVELOPMENTS CAN PREVENT THE DEPLETION OF NATURAL COMMODITIES
KRAUTKRAEMER 2005
[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]

The empirical evidence to date for natural resource commodities is largely in favor of technological progress. The many predictions of impending doom have not come true—at least not yet. The discovery and development of new reserves, the substitution of capital, and technological progress in resource extraction and commodity production have led to generally downward sloping price trends for many natural resource commodities. If there is any systematic bias to past predictions of the future, it is an underestimation of the ability of technological progress to overcome natural resource scarcity. For example, petroleum supply forecasts have persistently overestimated the future price of oil and underestimated oil production (Lynch 2002). The picture is less clear for the amenity goods and services derived from the natural environment.

RESOURCE SHORTAGES ALLOW CAPITALISTS TO FIND NEW RESOURCES TO USE, CHECKING BACK THE CRUNCH
SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFIED 20**05**
[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

The key theoretical idea is this: The growth of population and of income create actual and expected shortages and hence lead to price run-ups. A price increase represents an opportunity that attracts profit-minded entrepreneurs to seek new ways to satisfy the shortages. Some fail, at cost to themselves. A few succeed, and the final result is that we end up better off than if the original shortage problems had never arisen. That is, we need our problems though this does not imply that we should purposely create additional problems for ourselves.

INNOVATION AND FINDING NEW USES FOR RESOURCES MEAN THAT WE WON'T RUN OUT OF RESOURCES
KRAUTKRAEMER 2005
[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]

While exponential growth can be expected to lead to increasing resource scarcity, human creativity can ameliorate increased scarcity. Humans have been quite adept at finding solutions to the problem of scarce natural resources: finding more abundant substitutes for various natural resources, exploration for and discovery of new reserves, recovery and recycling of materials, and, perhaps most importantly, the development of new technologies that economize on scarce natural resources or that allow the use of resources that were previously uneconomical.

Recycling increases our reserves
Bjorn **Lomborg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 147

Third, we can recycle metals and thereby further increase the reserves. It is perhaps important to point out that metals, in contrast to energy, do not perish but only change form and location with use. At present about one-third of the global steel production is recycled, while the figures are 25-30 percent for aluminum, 25 percent for nickel, 45-50 per-cent for silver and lead, 15-20 percent for tin, 35-40 percent for copper and 20-25 percent for zinc.1048 There are, however, some barriers to recycling. Part of the metals is lost to corrosion, and some products are constructed such that it is only partially possible or even impossible to recycle the constituents. Actually, increased efficiency and recycling imply that it is theoretically possible never to run out of a limited resource, even with continued use. If we have a raw material with 100 years of consumption left with a 1 percent yearly increase in demand, and a 2 percent increase in recycling and/or efficiency, it is possible - without ever finding more resources - never to run out. This is simply because recycling or efficiency improvement - our ingenuity - compensates for both consumption and increases in consumption. 1049

Extensions #6: Knowledge/Tech Solves Scarcity

More efficient use and extraction methods decrease the need for resources
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 146-147

Second, we get better at extracting resources and using them more effectively. Today, your car contains only half as much metal as a car produced in 1970. Super-thin optical fibers carry the same number of telephone calls as 625 copper wires did just 20 years ago - and with better quality.1044 Newspapers can be printed on ever thinner paper because paper production has been much improved. Bridges contain much less steel, both because steel has become stronger and because we can calculate specifications more accurately. Many tools have become more durable and consequently we need to replace them less often.1045 Moreover, information technology has changed our consumption - relatively we buy fewer things and more bits. Programs worth several hundred dollars will fit on a CD-ROM worth only 2 cents in plastic.1046 Despite Americans becoming 30 percent more wealthy over the last 20 years their consumption of wood, metal and plastic has been declining.1047

There is a plethora of resources, and as technology improves, so does availability.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 145-146

It should be abundantly clear that we are far from exhausting our raw material resources. After the 3 percent of our raw material budget we spend on precious gems, nickel and crushed stone are the only raw materials costing more than 1 percent of the raw material budget, and we cannot run out of stone. Nickel is mainly used in alloys to make stain-less steel, and it is estimated that the identified reserves can last approximately 50 years at current levels of consumption. But it is also estimated that deep-sea nodules contain enough nickel for at least another thousand years.1039
Reviewing the 47 elements known to have advanced materials applications, studies from the late 1980s showed that only 11 seemed to have potentially insufficient reserves. These 11 elements are listed in Table 3. It turns out that for all but three the reserves have got bigger and not smaller since 1988. The total cost of these last three elements is about three-millionths of our global GDP. Tantalum is used in the aerospace industry, for high-tech alloys and in electronics. We will undoubtedly have to substitute parts of our tantalum use, and replacements will be either more expensive or less effective, but all in all this will constitute a very small cost.1040 The drop in mercury reserves is primarily caused by the fact that we use it still less - since 1971 global consumption has dropped to less than one-third - and consequently there is no commercial interest in finding new resources. It is estimated that with the present identified reserves there is mercury for more than 100 years 1041 Cadmium constitutes an even smaller problem. Cadmium is primarily used for rechargeable batteries, and technologically it can be replaced by many other - and often better - alternatives. However, the US Geological Survey estimates that "existing resources of cadmium should be adequate to meet demand far into the 21st century."1042 And the remaining elements have been getting more abundant, not less. This is why the classical college textbook on natural resource economics, Pearce and Turner, can conclude that the overwhelming evidence suggests that "physical scarcity is unlikely to be a significant problem for most of the materials currently in use."1045

Expanding new reserves increases our resources.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p.146

First, "known reserves" is still not a fixed measure. We can and do continuously find new deposits. This has been evident in Figure 77, where the most important raw materials have increased their number of years of consumption, despite a 2-15 times increase in annual consumption. When we do not find even more deposits even faster it is because searching costs money, and consequently they are discovered only within a reasonable time frame before their use. 146

Extensions #6: Knowledge/Tech Solves Scarcity

Use of resources will be overwhelmed by human ingenuity.

Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 124-125

That we can both use resources better and find more and more could be subsumed under the idea of human ingenuity. True, Earth is spherical and limited, but this is not necessarily a relevant objection. The problem is rather how large are the deposits that are actually accessible for exploitation. These deposits can seem limited, but if price increases this will increase the incentive to find more deposits and develop better techniques for extracting these deposits. Consequently, the price increase actually increases our total reserves, causing the price to fall again.

Actually, the question of whether resources are becoming more scarce or more abundant is staked on these two approaches: doomsayers claiming that resources are physically limited and consequently must grow scarcer and cornucopians focusing on human ingenuity and the empirical evidence of the data. Whether the one or the other is right is in truth an empirical question 884

Extensions #8: Resource Substitution

COMMODITIES THAT RUN OUT CAN ALWAYS BE REPLACED WITH MORE PLENTIFUL RESOURCES; TECHNOLOGY MEANS THAT WE CAN STRETCHB RESOURCES MORE
KRAUTKRAEMER 2005

[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]

Even if natural resource commodities are becoming more scarce, it may be possible to sustain economic production using lower levels of resource inputs to produce equivalent levels of goods and services. This may be achievable through technological progress or the substitution of other more plentiful inputs. The question of what mechanisms can sustain an economy dependent upon an essential nonrenewable resource was examined with highly stylized optimal growth models in the 1970s, and the results were an important theme in Scarcity and Growth Reconsidered (Stiglitz 1979; Daly 1979).
In a simple depletion model, if technological progress increases the output obtained from a given resource input, it is akin to having a growing resource stock. If the economy is patient enough to give technological progress the time to increase the effective resource stock, then positive economic growth is sustained (Stiglitz 1974).

Substitute resources will fill demand for natural resources.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 147

Fourth, we can often substitute one material for another. When Zaire, because of internal political problems, limited the supply of cobalt by 30 percent in 1978, this led to strong price hikes. But newly developed ceramic magnets soon replaced cobalt alloy magnets, and similarly cobalt-based paints were substituted with manganese-based paints, and cobalt prices quickly fell back.'o5° A study of US copper usage showed this substitution mechanism at work. Assuming that cheap copper would run out in 2070, leaving only very expensive rock mining, the total cost would nevertheless be fairly small (less than 0.5 percent of income), because most copper uses would be substituted 1051
Similarly, information technology has caused a substitution away from a number of traditional raw materials. When today we use much less mercury, it is partly because we increasingly use digital thermometers. As mentioned above, digital photography is likely to cut the consumption of silver by up to 50 percent. Actually, the vast majority of raw materials can be replaced by others, although only at a price (because otherwise they would already have been substituted).
Finally, demand for minerals has not grown exponentially as was feared by the doomsayers, but rather it has increased linearly:'o52 yet another reason not to worry excessively about the future supply of resources.

A2: You Can Count Resources

Resources may be finite in mathematical sense but their economic utility is infinite
Julian **Simon**, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, CATO Institute Daily Commentary, "Natural Resources Aren't Finite", March 4, 19**97**, http://cato.org/dailys/3-04-97.html

And why do they believe that commodities will grow more scarce? For many people, the idea that resources are finite is at the source of this belief. But the idea of finiteness is a prejudice and it is not supported by available facts.
Incredible as it may seem, the term "finite" is not only inappropriate, it is downright misleading when applied to natural resources. The mathematical definition of "finite" is quite different from a useful economic definition.
For instance, the quantity of services we obtain from copper should not be considered "economically" finite because there is no way of counting them appropriately. We should also consider the possibilities of using copper more efficiently, of creating copper or its economic equivalent from other materials, of recycling copper or even obtaining copper from sources beyond planet Earth.
Therefore, a working definition of the total services that we could obtain from copper now or in the future is impossible to construct.

Operationally the count of resources in the earth is relevant – the functional use of resources means more extraction, reuse or substitution is always possible
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 42-43

Most people do not at first feel comfortable with this point of view. The philosophy of scientific definitions may help. Consider the definition of the potential supply of oil that is implicitly or explicitly used by many people: the amount that would be recorded if someone conducted an exhaustive survey of all the Earth's contents. This quantity apparently is fixed. But such a definition is not operational, because such a survey is impossible. The operational supply of oil is that which is known today, or that which we may fore-cast as being known in the future, or that which we estimate will be sought and found under varying conditions of demand. These latter two quantities are decidedly not fixed but rather are changeable, and they are the ones relevant for policy decisions. (The next chapter will explore in greater depth the counterintuitive idea that supplies are not "finite.")
But there are other ways of adding to our raw-material supplies besides exploration. We must constantly struggle against the illusion that each time we take a pound of copper from the Earth there is less left to be used in the future. Too often we view natural resources as we view the operation of a single copper mine: dig some ore, and less is left. We must constantly remember that we create new mines and replenish the inventory of copper. The new "mines" may be somewhat different from the old ones—recycled metal from dumps, for example—but the new sources may be better rather than worse, so quality is not a necessary cause for concern. In exactly the same way that we manufacture paper clips or hula-hoops, we create new supplies of copper. That is, we expend time, capital, and raw materials to get them. Even more important, we find new ways to supply the services that an expensive product (or resource) renders, as we shall see shortly.

Infinite resource theory is true – even if we could count total raw materials the services we can get from them lack bounds over time
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 62-63

Incredible as it may seem at first, the term "finite" is not only inappropriate but is downright misleading when applied to natural resources, from both the practical and philosophical points of view. As with many important arguments, the finiteness issue is "just semantic." Yet the semantics of resource scarcity muddle public discussion and bring about wrongheaded policy decisions.
The ordinary synonyms of "finite," the dictionary tells us, are "countable" or "limited" or "bounded." This is the appropriate place to start our thinking on the subject, keeping in mind that the appropriateness of the term "finite" in a particular context depends on what interests us. Also please keep in mind that we are interested in material benefits and not abstract mathematical entities per se. (Mathematics has its own definition of "finite," which can be quite different from the common sort of definition we need here.)*
The quantity of the services we obtain from copper that will ever be avail-able to us should not be considered finite because there is no method (even in principle) of making an apporpriate count of it, given the problem of the economic definition of "copper," the possibility of using copper more efficiently, the possibility of creating copper or its economic equivalent from other materials, the possibility of recycling copper, or even obtaining copper from sources beyond planet Earth, and thus the lack of boundaries to the sources from which "copper" might be drawn. That is, one cannot construct a working definition of the total services that we now obtain from copper and that can eventually be obtained by human beings.14

didn't think we had cards on that did you?

A2: You Can Count Resources

Arguments of resource finiteness presume use is countable – realistic economic definitions of finite allow infinite growth and resources
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 64

Well-wishers have advised me to "admit" that resources are limited to the capacities of the planet, thinking that this will keep me from "losing credibility" And I seem pigheaded to them when I do not follow their advice. But this is why I continue to argue that these quantities are not finite: The rhetorical difficulty is that as soon as one would "admit" that there are only (say) seven billion years of energy, some doomsters begin to work backward to argue that the sun's measurable size and rate of energy output means that the supply of energy is finite for next year. But that's physical estimate—it's not an economic definition of "energy," any more than copper atoms in the Earth's crust is a useful economic definition of "copper."
Objections to the notion of nonfiniteness often come from a mathematical background. Yet there is ample justification even within mathematics itself for taking the point of view that I do, and mathematical statisticians such as Barrow and Tipler affirm this. As Tipler puts it, "The laws of physics do not forbid perpetual economic growth."22
I continue to stand on the ground of nonfiniteness because I have found that leaving that ground leads to more bad arguments than standing on it, even though it seems so strange to many. and I doubt that many people's judgment will be affected by what I write on this particular issue. Hence there is little temptation to trim my sails to this wind, and do that which is offensive to me—to "admit" something that I do not believe is so.

A2: Price Is A Bad Measure Of Scarcity

PRICE IS A GOOD INDICATOR OF RESOURCE AVAILABILITY
KRAUTKRAEMER 2005

[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]

The other two economic measures of resource scarcity—price and user cost—do incorporate information about the demand for the resource and, at least to the extent possible, expectations about future demand and availability. For this reason they are generally preferred as indicators of resource scarcity (Brown and Field 1979; Fisher 1979). The resource price would "…summarize the sacrifices, direct and indirect, made to obtain a unit of the resource (Fisher 1979)," since the price would capture both user cost and the current extraction cost. User cost would be the best measure of the scarcity of the unextracted resource. For most of the twentieth century, natural resource commodity price trends have been generally flat or decreasing. This is particularly true for mineral prices. Since these are nonrenewable resources, one might expect they would be more subject to increasing scarcity and therefore increasing prices. However, mineral prices have been generally declining over the twentieth century (Sullivan et al. 2000). Figures 1 through 4 show the long-term price curves for copper, lead, petroleum, and natural gas.

A2: Julian Simon Indicts

Simon's research is solid, supported by the facts, and qualified. Prefer our evidence because their authors are just environmentalists who are angry that Simon de-justified their work.
Wattenberg 98 (Ben, "Malthus, Watch Out", printed in Wall Street Journal, February 11, Ben is a Senior Fellow @ the American Enterprise Institute)

Simon could sometimes glow like an exposed wire, crackling with nervous intellectual intensity. Privately, he had a soul of purest honey. But by force of will, fueled by his sizzling energy, Simon helped push a generation of Americans to rethink their views on population, resources and the environment. By now it is clear that in this task he was largely successful. As the years roll on he will be more successful yet, his work studied, and picked at, by regiments of graduate students.
His keystone work was "The Ultimate Resource," published in 1981 and updated in 1996 as "The Ultimate Resource 2" (Princeton University Press). Its central point is clear: Supplies of natural resources are not finite in any serious way; they are created by the intellect of man, an always renewable resource. Coal, oil and uranium were not resources at all until mixed well with human intellect.
The notion drove some enviromentalists crazy. If it were true, poof!--there went so many of the crises that justified their existence. From their air-conditioned offices in high-rise buildings, they brayed: Simon believes in a technological fix! The attacks often got personal: Simon's doctorate was in business economics, they sniffed; he had merely been a professor of advertising and marketing, and--get this--he had actually started a mail-order business and written a book about how to do it. Never mind that he also studied population economics for a quarter century.
In fact, it was Simon's knowledge of real-world commerce that gave him an edge in the intellectual wars. He knew firsthand about some things that many environmentalists had only touched gingerly, like prices. If the real resource was the human intellect, Simon reasoned, and the amount of human intellect was increasing, both quantitatively through population growth and qualitatively through education, then the supply of resources would grow, outrunning demand, pushing prices down and giving people more access to what they wanted, with more than enough left over to deal with pollution and congestion. In short, mankind faced the very opposite of a crisis.
Simon rarely presented a sentence not supported by facts--facts arranged in serried ranks to confront the opposition; facts about forests and food, pollution and poverty, nuclear power and nonrenewable resources; facts used as foot soldiers to strike blows for accuracy.

Simon's facts and analysis are solid, his critics are simply not listening to his research – prefer our evidence because it comes from someone who was once a Simon critic, and is extremely balanced
Moore 98 (Stephen, March/April, "Julian Simon Remembered: It's A Wonderful Life", President of the Free Enterprise Fund and previous Cato Institute director of fiscal policy studies, http://www.overpopulation.com/faq/People/julian_simon.html")

It was back in the midst of that aura of gloom that by chance I enrolled in Simon's undergraduate economics course at the University of Illinois. After the first week of the course, I was convinced that his multitude of critics were right. He must be a madman. How could anyone believe the outlandish claims he was making? That population growth was not a problem; that natural resources were becoming more abundant; that the condition of the environment was improving. That the incomes of the world's population were rising. Simon made all of those bold proclamations and more in his masterpiece *The Ultimate Resource*, published in 1980. I read the book over and over—three times, in fact—and I came to the humbling realization that everything I had been taught since the first grade about population and environmental issues had been dead wrong.
The weight of the facts that Simon brought to bear against the doomsayers was simply so overpoweringly compelling that I, like so many others, became a Julian Simon fanatic. Julian was the person who brought me to Washington in 1982 to work as his research assistant as he finished his next great book (coedited with the late futurist Herman Kahn of the Hudson Institute) titled The Resourceful Earth: A Response to Global 2000.
So for more than 15 years I was privileged to occupy a front-row seat from which I watched as Simon thoroughly and often single-handedly capsized the prevailing Malthusian orthodoxy. He routed nearly every prominent environmental scaremonger of our time: from the Club of Rome, to Paul Ehrlich, to Lester Brown, to Al Gore. (After reading Earth in the Balance, Julian was convinced that Gore was one of the most dangerous men and one of the shallowest thinkers in all of American politics.)
Simon's dozens of books and his more than 200 academic articles always brought to bear a vast arsenal of compelling data on and analysis of how life on earth was getting better, not worse. Simon argued that we were not running out of food, water, oil, trees, clean air, or any other natural resource because throughout the course of human history the price of natural resources had been declining. Falling long-term prices are prima facie evidence of greater abundance, not increasing scarcity. He showed that, over time, the environment had been getting cleaner, not dirtier. He showed that the "population bomb" was a result of a massive global reduction in infant mortality rates and a stunning increase in life expectancy. "If we place value on human life," Simon argued, "then those trends are to be celebrated, not lamented."

And, Simon's bet with Ehrlich proves – when his critics put their money where their mouths are, they lose.
Carnell 2000 (Brian, May 18, writes for overpopulation.com, http://www.overpopulation.com/faq/People/julian_simon.html)

In 1980, economist |Julian Simon| and biologist Paul Ehrlich decided to put their money where their predictions were. Ehrlich had been predicting massive shortages in various natural resources for decades, while Simon claimed natural resources were infinite.Simon offered Ehrlich a bet centered on the market price of metals. Ehrlich would pick a quantity of any five metals he liked worth $1,000 in 1980. If the 1990 price of the metals, after adjusting for inflation, was more than $1,000 (i.e. the metals became more scarce), Ehrlich would win. If, however, the value of the metals after inflation was less than $1,000 (i.e. the metals became less scare), Simon would win. The loser would mail the winner a check for the change in price.
Ehrlich agreed to the bet, and chose copper, chrome, nickel, tin and tungsten.
By 1990, all five metal were below their inflation-adjusted price level in 1980. Ehrlich lost the bet and sent Simon a check for $576.07. Prices of the metals chosen by Ehrlich fell so much that Simon would have won the bet even if the prices hadn't been adjusted for inflation. (1) Here's how each of the metals performed from 1980-1990.

didn't think we had cards on that did you?

A2: Bjorn Lomborg Indicts

Lombarg uses credible, qualified, and accessible statistics – our evidence is the best.
Bjorn **Lombarg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 31

The book also has more than 1,800 references. However, I have tried to source as much of the information from the Internet as possible. If people are to check what I write, it is unreasonable to expect them to have a research library at their disposal. Instead it is often sufficient to go on to the Internet and download the relevant text to see from where I have retrieved my data and how I interpret that information. Of course there will always be books and articles central to the relevant literature which are not available on the net. In addition, the Internet has made it possible for me to bring the book right up to date, with data accessed and updated up to May 2001.
But for me the most important thing is that there is no doubt about the credibility of my sources. For this reason most of the statistics I use come from official sources, which are widely accepted by the majority of people involved in the environment debate. This includes our foremost global organization, the United Nations, and all its subsidiary organizations: the FAO (food), the WHO (health), the UNDP (development) and the UNEP (environment). Furthermore, I use figures published by international organizations such as the World Bank and the IMF, which primarily collate economic indicators.
Two organizations work to collect many of the available statistics; the World Resources Institute, together with the UNEP, the UNDP and the World Bank, publishes every other year an overview of many of the world's most important data. The Worldwatch Institute also prepares large amounts of statistical material every year. In many fields the American authorities gather information from all over the world, relating for example to the environment, energy, agriculture, resources and population. These include the EPA (environment), USDA (agriculture), USGS (geological survey) and the US Census Bureau. Finally, the OECD and EU often compile global and regional figures which will also be used here. As for national statistics, I attempt to use figures from the relevant countries' ministries and other public authorities.

A2: Technology Growth Will Stop

Human progress will accelerate over the next century—this makes technological development inevitable
Kurzweil, author, inventor, and winner of the National Medal of Technology**, and Grossman**, founder and medical director of Frontier Medical Institute, 20**04** (Ray, and Terry, "Immortality is Within Our Grasp," November 17, http://longevitymeme.org/articles/viewarticle.cfm?page=1&article_id=21)

As interesting as the first two decades of this century are likely to be, subsequent decades should lead to even more dramatic changes. Ray has spent several decades studying and modeling technology trends and their impact on society. Perhaps his most profound observation is that the rate of change is itself accelerating. This means that the past is not a reliable guide to the future. The 20th century was not 100 years of progress at today's rate but, rather, was equivalent to about 20 years, because we've been speeding up to current rates of change. And we'll make another 20 years of progress at today's rate, equivalent to that of the entire 20th century, in the next 14 years. And then we'll do it again in just 7 years. Because of this exponential growth, the 21st century will equal 20,000 years of progress at today's rate of progress - 1,000 times greater than what we witnessed in the 20th century, which itself was no slouch for change.
The result will be profound changes in every facet of our lives, from our health and longevity to our economy and society, even our concepts of who we are and what it means to be human. Within a couple of decades we will have the knowledge to revitalize our health, expand our experiences - such as full-immersion virtual reality incorporating all of the senses, augmented reality, and enhanced human intelligence and capability - and expand our horizons.
As we peer even further into the 21st century, nanotechnology will enable us to rebuild and extend our bodies and brains and create virtually any product from mere information, resulting in remarkable gains in prosperity. We will develop means to vastly expand our physical and mental capabilities by directly interfacing our biological systems with human-created technology.

We can't run out of technology – discoveries always beget further questions that are always solved
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 405-406

Some ask: can we know that there will be discoveries of new materials and of productivity-enhancing techniques in the future? Behind the question lies the implicit belief that the production of new technology does not follow predict-able patterns of the same sort as the patterns of production of other products such as cheese and opera. But there seems to me no warrant for belief in such a difference, either in logic or in empirical experience. When we add more capital and labor, we get more cheese; we have no logical assurance of this, but such has been our experience, and therefore we are prepared to rely upon it. The same is true concerning knowledge about how to increase the yield of grain, cows, milk, and cheese from given amounts of capital and labor. If you pay engineers to find ways to solve a general enough problem—for example, how to milk cows faster, or with less labor—the engineers predictably will do so. There may well be diminishing returns to additional inventive effort spent on the same problem, just as there are diminishing returns to the use of fertilizer and labor on a given farm in a given year. But as entirely new forms of technology arise and are brought to bear on the old problems, the old diminishing-returns functions then no longer apply.
The willingness of businesses to pay engineers and other inventors to look for new discoveries attests to the predictability of returns to inventive effort. To obtain a more intimate feeling for the process, one may ask a scientist or engineer whether she expects her current research project to produce results with greater probability than if she simply sat in the middle of the forest reading a detective novel; the trained effort the engineer applies has a much greater likelihood of producing useful information—and indeed, the very in-formation that is expected in advance—than does untrained noneffort. This is as predictable in the aggregate as the fact that cows will produce milk, and that machines and workers will turn the milk into cheese. Therefore, to depend upon the fact that technical developments will continue to occur in the future—if we continue to devote human and other resources to research—is as reasonable as it is to depend upon any other production process in our economy or civilization. One cannot prove logically that technical development will continue in the future. But neither can one so prove that capital and labor and milk will continue to produce cheese, or that the sun will come up tomorrow
As I see it, the only likely limit upon the production of new knowledge about resources is the occurrence of new problems; without unsolved problems there will be no solutions. But here we have a built-in insurance policy: if our ultimate interest is resource availability, and if availability should diminish, that automatically supplies an unsolved problem, which then leads to the production of new knowledge, not necessarily immediately or without short-run disruption, but in the long run.

A2: Short-Term Scarcity Figures

ENVIRONMENTAL TRENDS ONLY LOOK NEGASTIVE IN THE SHORT TERM TRENDS; ALL LONG TERM TRENDS POINT TO THE SKY

SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFIED 20**05**

[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

For proper understanding of the important aspects of an economy we should look at the long-run trends. But the short-run comparisons - between the sexes, age groups, races, political groups, which are usually purely relative - make more news. To repeat, just about every important long-run measure of human welfare shows improvement over the decades and centuries, in the United States as well as in the rest of the world. And there is no persuasive reason to believe that these trends will not continue indefinitely.

A2: Cost Of Technological Alternatives Too High

Your argument ignores cost reduction and likely future progress on energy questions
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 16

When the doomsayers hear that oil can be obtained from various kinds of crops, they say, "Yes, but it costs much more than fossil fuels." They do not imagine the cost reductions from increased efficiency that will inevitably take place in the future, and they do not foresee that the total cost of energy, already a very small part of our economy, will become even smaller in the future. And when they hear that the rich countries are becoming cleaner and less polluted with each decade, the doomsayers say, "But what about the poor countries?" They do not imagine that the poor countries, when they become richer, will also eventually turn to becoming cleaner rather than dirtier, as the now-rich countries have done. Again and again they do not imagine the adjustments that individuals and communities make that create more resources, invent better technologies, and overcome environmental problems.

A2: Our Estimates Account For Technology

Technical estimates are flawed because they are inherently conservative and require speculation of future technology
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 46

A third difficulty with material-technical forecasts: the methods that go beyond the "known reserves" concept necessarily depend on more speculative assumptions than does the economic approach. Material-technical forecasts must make very specific assumptions about discoveries of unknown lodes and about technologies that have yet to be developed. Making the "conservative" (read "unimaginative") assumption that future technology will be the same as present technology would be like making a forecast of twentieth-century cop-per production on the basis of eighteenth-century pick-and-shovel technology. (Indeed, we must be wary of a tendency of experts in a given field to underestimate the scope of future technological changes and their impact on the economy. As Simon Kuznets said, "Experts are usually specialists skilled in, and hence bound to, traditional views and they are, because of their knowledge of one field, likely to be cautious and unduly conservative.")3 In contrast, the economic approach makes only one assumption, to wit, that the long-run trend of declining costs will continue.

Supplies of most important resources are sufficient for many lifetimes – and any contrary technical estimate is inherently less reliable than economic predictions
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 51-52

The potential supplies of all the important minerals are sufficient for many many lifetimes, on the basis of almost any assumption about these minerals' abundance on Earth. This material-technical assessment is entirely consistent with the historical economic evidence of falling prices relative to wages for all raw materials, showing a trend of increasing availability and declining scar-city, as discussed in chapters 1, 5, 8, 10, and 11.
Material-technical forecasts of resource exhaustion often go wrong for two reasons. (1) No matter how closely defined, the physical quantity of a resource in the Earth is not known at any time, because resources are sought and found only as they are needed; an example is the increase in the known supplies of such resources as copper, as shown in table 2-1 and figure 2-1. (2) Even if the physical quantities of particular closely defined natural resources were known, such measurements would not be economically meaningful, because we have the capacity to develop additional ways to meet our needs: for example, by using fiber optics instead of copper wiring, by developing new ways to exploit low grades of copper ore previously thought not usable, and by developing new energy sources such as nuclear power to help produce copper, perhaps by extracting it from seawater. Thus, the existing "inventory" of natural resources is operationally misleading; physical measurements do not de-fine what we will be able to use as future supplies. As one wise geologist put it:
Reserves are but a small part of the resources of any given commodity. Reserves and resources are part of a dynamic system and they cannot be inventoried like cans of tomatoes on a grocer's shelf. New scientific discoveries, new technology, and new commercial demands or restrictions are constantly affecting amounts of reserves and resources. Reserves and resources do not exist until commercial demand puts a value on a material in the market.16

A2: Law Of Diminishing Returns

There is no "law" of diminishing returns since technology and usability aren't finite
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 70

"Bur the law of diminishing returns must come to bear sometime," people often say, meaning that eventually the cost of extracting mineral resources must rise, even if the cost will not rise in the near future.
Happily, there is no "law" that compels cost to rise eventually. The concept of diminishing returns applies to situations where one element is fixed in quantity—say, a given copper mine—and where the type of technology is also fixed. But neither of these factors applies to mineral extraction in the long run. New lodes are found, and new cost-cutting extraction technologies are developed. Therefore, whether the cost rises or falls in the long run depends on the extent to which advances in technology and discoveries of new lodes counter-act the tendency toward increasing cost in the absence of the new developments. Historically, as we have seen, costs have consistently fallen rather than risen, and there is no empirical warrant for believing that this historical trend will reverse itself in the foreseeable future. Hence, no "law" of diminishing returns is appropriate here.

A2: Internal Contradictions ➔ Scarcity

Long-term resource scarcity or damning pollution is impossible – humans are genetically predisposed to deal with these problems effectively
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 76-77

Many who are pessimistic about the outcome of the present course of civilization suggest that the externalities of pollution are such an "internal contradiction" that will do us in. Some political organizations and devices have evolved to deal with the matter, and we have both public and private cleanup and collection of various kinds of garbage, as well as laws that regulate pollution behavior. But the possible changes in pollutions, and the recency of the onset of regulatory activities, certainly leave room to wonder whether we have yet evolved reliable patterns of dealing with pollution problems.
Intergenerational relationships with respect to resources are another frequently mentioned possible "internal contradiction," that is, one generation exploiting a resource and leaving too little for the next generation. Futures markets, both those that buy and sell the resources themselves and those that sell and buy the shares of resource-supplying firms, have evolved to protect against this potential danger. And we have had a long enough history by now to be confident that this evolved mechanism is reliable and satisfactory for the purpose.
In conclusion, I am suggesting that humankind has evolved culturally (and perhaps also genetically) in such a manner that our patterns of behavior (with social rules and customs being a crucial part of these patterns) predispose us to deal successfully with resource scarcity. This view of human history is consistent with the observed long-term trend toward greater resource availability, and with the positive (and growing) preponderance of our creative over our exploitational activities. This view provides a causal foundation for the observed benign resource trends. It argues against our being at a turning point in resource history now, and thereby buttresses the technique of simply extrapolating from past trends that produces forecasts of increasing rather than decreasing resource availability. That is, our evolved patterns have given us greater rather than less command over resources over the centuries. The market system is part of that evolution, of course. But it is not the whole of it. The story of Robinson Crusoe (which has been badly twisted by economists, who make it a story of allocation when it is really a story of ingenuity and the use of the knowledge that he brought with him) also illustrates this point, for example, that by this time we have developed a body of knowledge and a set of patterns which allow us to improve our resource situation rather than make it worse, even as we use resources and even in the absence of an exchange mechanism.

A2: Entropy Mandates Scarcity

Entropy isn't a concern – the earth is not a closed system and even if it is we have billions of years to leave the rock
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 79

The concept of entropy is unquestionably valid and relevant for a closed container in the laboratory. It may also be relevant for any larger entity that can reasonably be considered a closed system. But it is quite unclear where the boundary should be drawn for discussions of the quantity of energy, or if there is any relevant boundary. It is clearly wrong to say that "as to the scarcity of matter in a closed system, such as the earth, the issue may, in my opinion, prove in the end more critical than that of energy";4 the Earth is not a closed system because both energy (from the sun) and matter (cosmic dust, asteroids, debris from many planets) constantly rain down on the Earth. Perhaps the solar system will prove to be an isolated system for some period in the future, conceivably for the entire life of the human species. But even then it will last perhaps seven billion years. And the chances would seem excellent that during that span of time humans will be in touch with other solar systems, or will find ways to convert the matter on other planets into the energy we need to continue longer. So with respect to energy there is no practical boundary surrounding any unit of interest to us. And without such a boundary, the notion of entropy in the large is entirely irrelevant to us.*

Entropy is irrelevant to life on earth
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 81

The concept of entropy simply doesn't matter for human well-being. Our earthly island of order can grow indefinitely within the universal sea of chaos. Life could even spread from earth to other plants, other galaxies, and so on, incorporating an increasing portion of the universe's matter and energy. What happens at the end of time is anybody's guess: the universe may or may not be bounded. Who cares? That's well beyond the lifetime of our sun. Logically, we should worry much more about the death of our own sun than the supposed limits imposed by entropy and the "laws" of physics.

A2: Energy Scarcity

Energy is virtually infinite – there is no risk of running out of cheap energy
Jerry **Taylor,** Director of Natural Resource Studies at the CATO Institute, “The Growing Abundance of Natural Resources” in “Market Liberalism: A Paradigm for the 21st Century”, 19**93**, http://cato.org/pubs/chapters/marlib21.html

Contrary to popular belief, energy stocks of all kinds, both fossil and nonfossil, have been increasing steadily and dropping in price. We face unprecedented abundance, not scarcity.
As noted by MIT professor Morris Adelman, one of America's foremost energy experts, "The great oil shortage is like the horizon, always receding as one moves toward it."6 The world has nearly 10 times the amount of proven oil reserves that it had in 1950 and almost twice the known reserves of 1970. In fact, proven oil reserves are greater today than at any other time in recorded history.
Oil prices have dropped 35 percent in constant dollars since 1980. When indexed to U.S. wages, oil prices have dropped 43 percent since 1980 and show steady and continuing declines in price from as far back as 1870.7 The decline in oil prices has been reflected in the price of gasoline at the pump. Fuel prices in constant dollars are 6 percent lower today than they were in 1972 (just before the OPEC oil embargo), 25 percent lower than in 1963, and 30 percent lower than in 1947.8 Whereas 3.2 percent of total household expenditures were devoted to gasoline in 1972 (the lowest such rate since 1952), American households today devote but 2.6 percent of total expenditures to gasoline purchases.9
Proven natural gas reserves have also shown dramatic increases in the past 20 years; they have increased by 84 percent since 1974. At current rates of consumption, proven gas reserves alone will be sufficient for approximately 58 years.10 The fact that natural gas prices, after adjusting for inflation, have dropped only 3 percent since 1980 is largely a function of price and production controls that lingered into the 1980s and discouraged optimum product levels.
Likewise, between 1979 and 1989 proven coal reserves grew by 84 percent, an amount sufficient for 238 years given current levels of consumption.11 On an energy equivalent basis, proven reserves of coal are 43 percent greater than the world's combined total proven oil and natural gas reserves.12 Since 1980 the price of coal has dropped 91 percent when adjusted for inflation and 243 percent when indexed to U.S. wages.13
Economist William Nordhaus concludes from U.S. Geological Survey data that the world has enough ultimately recoverable fossil fuel reserves to last approximately 520 years given projected rates of demand, although others have pegged that figure as high as 650 years.14 If historic rates of productivity increase and technological advances are considered, then we have every reason to believe that the 1,000-year trend of falling energy prices will continue for generations to come.
Remember, the figures cited above are for fossil fuel reserves only. Current nuclear technology ensures that the world has 8,400 years of energy for the future at current rates of consumption.15 Advances in nuclear breeder and fusion technologies would ensure vast supplies of energy for tens of thousands of years, and geothermal resources and the potential of solar energy also promise virtually limitless supplies of energy as technology improves and those sources become more economically competitive.

Energy is infinite – cheap energy is inexhaustible
Simon in ‘96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, “The Ultimate Resource 2”, 1996, p. 6

Energy. Grab your hat again—the long-run future of our energy supply is at least as bright as that of other natural resources, though government intervention can temporarily boost prices from time to time. Finiteness is no problem here either. And the long-run impact of additional people is likely to speed the development of cheap energy supplies that are almost inexhaustible.

A2: Energy Scarcity

Energy is becoming less costly in relation to wages indicating rising abundance
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 167-168

The ratio of the price of electricity to the average wage in manufacturing (fig. 11-4) shows that the quantity of electricity bought with an hour's wages has steadily increased. Because each year an hour's work has bought more rather than less electricity, this measure suggests that energy has become ever less troublesome in the economy over the recorded period, no matter what the price of energy in current dollars.
In short, the trends in energy costs and scarcity have been downward over the entire period for which we have data. And such trends are usually the most reliable bases for forecasts. From these data we may conclude with considerable confidence that energy will be less costly and more available in the future than in the past.

Zero risk of a finite energy supply
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 179-180

In coming years, solar energy may be used to heat homes and water in many parts of the world. (As of 1965, much of Israel's hot water had been heated by solar devices for years, even when the price of oil was much lower than it is now, although I remember that the showers you got with this water were at best lukewarm unless you used a backup electrical system to boost the temperature.) If the prices of conventional energy supplies were to rise considerably higher than they now are, solar energy could be called on for much more of our needs, though this price rise seems unlikely given present technology. And even if the Earth were sometime to run out of sources of energy for nuclear processes – a prospect so distant that it is a waste of time to talk about it – there are energy sources on other planets. Hence, the notion that the supply of energy is finite because the Earth's fossil fuels or even its nuclear fuels are limited is sheer nonsense. And this discussion has omitted consideration of any energy sources still to be discovered.

Malthusian energy theory is historically disproved by falling energy prices and a cap at nuclear prices
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 180

Energy differs from other resources because it is "used up," and cannot be recycled. Energy apparently trends toward exhaustion. It seems impossible to keep using energy and still never begin to run out—that is, never reach a point of increasing scarcity. But the long-run trends in energy prices, together with the explanatory theory of induced innovation, promise continually decreasing scarcity and cost just the opposite of popular opinion. At worst, the cost ceiling provided by nuclear power guarantees that the cost of electrical power cannot rise far above present energy costs, political obstacles aside.
The historical facts entirely contradict the commonsensical Malthusian theory that the more we use, the less there is left to use and hence the greater the scarcity. Through the centuries, the prices of energy—coal, oil, and electricity—have been decreasing rather than increasing, relative to the cost of labor and even relative to the price of consumer goods, just as with all other natural resources. And nuclear energy, which at present costs much the same as coal and oil,21 guarantees an inexhaustible supply of energy at declining cost as technology improves.
In economic terms, this means that energy has been getting more available, rather than more scarce, as far back as we have data. This implies that the rate at which our stocks of resources increase, or the increasing efficiency of use over time, or a combination of the two forces, have overmatched the exhaustion of resources.

A2: Energy Scarcity

The use of fossil fuels is becoming more and more efficient – eroding the arguments for scarcity.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 125-126

At the same time we have become better at exploiting each liter of oil. The average US car has improved its mileage by 60 percent since 1973 889 Likewise, home heating in Europe and the US has improved by 24-43 percent890 Many appliances have become much more efficient - the dishwasher and the washing machine have cut about 50 percent of their energy use891
Still, efficiency has much potential to be increased. It is estimated that 43 percent of American energy use is wasted.892 The US Department of Energy estimates that we could save anywhere from 50 percent to 94 percent of our home energy consumption 893 We know today that it is possible to produce safe cars getting more than 50-100 km per liter (120-240 mpg)894 Of course, while such efficiency gains have often been documented, the reason why they have not all been utilized is simply because it does not pay at the current energy price and level of technology.895
Most nations actually exploit energy better and better: we use less and less energy to pro-duce each dollar, euro or yen in our national product. Figure 68 shows how the US has produced ever more goods with the same amount of energy since 1800, and this holds true for the UK since 1880 and the EU and Japan from 1973 897 For the world at large, almost twice the amount of wealth was produced in 1992 per energy unit compared to 1971898 Over the same period Denmark actually went even further and "delinked" the connection between a higher GDP and higher energy consumption: in total Denmark used less energy in 1989 than in 1970 despite the GDP growing by 48 percent during that time.899

Fossil fuels will not run out in the near future – in the long run, knowledge and capital will equipt future generations to lead good lives.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 119

he main question is whether this dependency is sustainable. The surprising answer is that we will not run out of fossil fuel within the foreseeable future.
But what do we do in the long run? Our present-day energy supply is based on coal and oil, created over millions of years. Many have pointed out the apparent problem that - to uphold our civilization - we consume millions of years' resources in just a few hundred years.
Rather, we should use our resources sustain-ably, such that our consumption does not pre-vent future generations from also making use of these resources. But even if this argument sounds quite reasonable, it is impossible to use isolated, non-renewable resources such that future generations can also be assured of their use.855 Even if the world used just one barrel of oil a year this would still imply that some future generation would be left with no oil at all.856
However, this way of framing the question is far too simple. According to the economics Nobel laureate Robert Solow, the question of how much we can allow ourselves to use of this or that resource is a "damagingly narrow way to pose the question."857 The issue is not that we should secure all specific resources for all future generations - for this is indeed impossible - but that we should leave the future generations with knowledge and capital, such that they can obtain a quality of life at least as good as ours, all in all.

A2: Oil Scarcity

Oil is not finite since we can always draw more sources for the services it provides
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 178-179

You may wonder whether "nonrenewable" energy resources such as oil, coal, and natural gas differ from the recyclable minerals in such a fashion that the nonfinite arguments in earlier chapters do not apply. Eventually we'll burn all the coal and oil that powered these impressive advances, you may be thinking. But our energy supply also is nonfinite, including oil as an important example. That was not a misprint. In chapter 3, I showed that it is necessary to say how one would count the amount of a resource if one is to meaningfully say that the resource is finite. Therefore, let's consider the following sequence of difficulties with respect to counting the amount of oil. As with other resources, careful thinking leads to the conclusion that the potential amount of oil—and even more, the amount of the services that we now get from oil—is not finite.
1. The oil potential of a particular well may be measured, and hence it is limited (though it is interesting and relevant that as we develop new ways of extracting hard-to-get oil, the economic capacity of a well increases). But the number of wells that will eventually produce oil, and in what quantities, is not known or measurable at present and probably never will be, and hence is not meaningfully finite.
2. Even if we unrealistically assume that the number of potential wells in the Earth might be surveyed completely and that we could arrive at a reasonable estimate of the oil that might be obtained with present technology (or even with technology that will be developed in the next one hundred years), we still would have to reckon the future possibilities of shale oil and tar sands—a difficult task.
3. But let us assume that we could reckon the oil potential of shale and tar sands. We would then have to reckon the conversion of coal to oil. That, too, might be done, but the measurement is becoming increasingly loose, and hence less "finite" and "limited."
4. Then there is the oil that we might produce, not from fossils, but from new crops—palm oil, soybean oil, and so on. Clearly, there is no meaningful limit to this source except the sun's energy (land and water are not limits—see chapters 6 and 10). The notion of finiteness is making ever less sense as we proceed.
5. If we allow for the substitution of nuclear and solar power for oil—and this makes sense because what we really want are the services of oil and not oil itself—the notion of a limit is even less meaningful.
6. Of course the sun may eventually run down. But even if our sun were not as vast as it is, there may well be other suns elsewhere.

Oil is not key – we will replace it with other sources.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 126

3. We can substitute. We do not demand oil as such but rather the services it can provide. Most often we want heating, energy or fuel, and this we can obtain from other sources. Therefore we can swap to other energy sources if they show themselves to be better or cheaper. In England around the year 1600 wood became increasingly expensive (because of local deforestation and bad infrastructure) and this prompted a gradual switch over to coal, a similar movement to the one in the US, depicted in Figure 62.90° During the latter part of the nineteenth century a similar substitution took place from coal to oil. In the short run, it would be most obvious to substitute oil with the other commonly known fossil fuels such as gas and coal. In the longer run, however, it is quite possible that we will cover a large part of our energy consumption using nuclear power, wind and solar power, biomass and shale oil.

Improving technology means we can extract more oil – the usable amount in current reserves therefore constantly increases.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 125

2. We become better at exploiting resources. We use new technology to be able to extract more oil from known oil fields, we become better at finding new oil fields, and we can start exploiting oil fields that previously were too expensive and/or difficult to exploit. An initial drilling typically exploits only 20 per-cent of the oil in the reservoir. Even with present-day, advanced techniques, using water, steam or chemical flooding to squeeze out extra oil, more than half the resource commonly remains in the ground unexploited. It is estimated that the ten largest oil fields in the United States will still contain 63 percent of their original oil when production closes down.S87 Consequently, there is still much to be reaped in this area. In the latest US Geological Survey assessment, such technical improvement is expected to yield more than a 50 percent increase of identified reserves888 125

A2: Oil Scarcity

There is sufficient oil for over 5000 years; any short falls will be solved by alternate sources.
Bjorn **Lomborg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 135-136

The evidence clearly shows that we are not headed for a major energy crisis. There is plenty of energy.
We have seen that although we use more and more fossil energy we have found even more. Our reserves - even measured in years of consumption - of oil, coal and gas have increased. Today we have oil for at least 40 years at present consumption, at least 60 years' worth of gas, and 230 years' worth of coal.
At $40 a barrel (less than one-third above the current world price), shale oil can supply oil for the next 250 years at current consumption. And all in all there is oil enough to cover our total energy consumption for the next 5,000 years. There is uranium for the next 14,000 years. Our current energy costs make up less than 2 percent of the global GDP, so even if we were to see large price increases it would still not have significant welfare impact - in all likelihood the budget share for energy would still be falling.
Moreover there are many options using renewable energy sources. Today, they make up a vanishingly small part of the global energy production, but this can and probably will change. The cost of both solar energy and wind energy has dropped by 94-98 percent over the last 20 years such that they have come much closer to being strictly profitable. Renewable energy resources are almost incomprehensibly large. The sun leaves us with about 7,000 times our own energy consumption - for example, covering just 2.6 per-cent of the Sahara Desert with solar cells could supply our entire global energy consumption. It is estimated that wind energy realistically could cover upwards of half of our total energy consumption.
Notice that all of these facts do not contest that fossil fuels which today supply most of our energy are non-renewable - if technology remained constant and we kept on using just fossil fuels, we would some day run out of energy. But the point is that technology does not remain constant and fossil fuels are not our only or main long-term energy source. First, the historical evidence shows that we have become constantly better able to find, extract and utilize fossil fuels, outpacing even our increased consumption. Second, we know that the available solar energy far exceeds our energy needs and it will probably be available at competitive prices within 50 years.
Consequently, it is surprising that over and over again we hear the stories that now we will run out of energy. The data show us that this is not plausible. As the US Energy Information Agency wrote in the International Energy Outlook 1999: "bleak pictures painted of the world's remaining oil resource potential are based on current estimates of proven reserves and their decline in a [typical, theoretical] manner. When undiscovered oil, efficiency improvements, and the exploitation of unconventional crude oil resources are taken into account, it is difficult not to be optimistic about the long-term prospects for oil as a viable energy source well into the future."999
In the longer run, it is likely that we will change our energy needs from fossil fuels towards other and cheaper energy sources - maybe renewables, maybe fusion, maybe some as-of-now unimagined technology. Thus, just as the stone age did not end for lack of stone, the oil age will eventually end but not for lack of oil. Rather, it will end because of the eventual availability of superior alternatives.

Demand for oil will constantly spur the finding of new oil reserves.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 125

1. "Known resources" is not a finite entity. It is not that we know all the places with oil, and now just need to pump it up. We explore new areas and find new oil. But since searching costs money, new searches will not be initiated too far in advance of production. Consequently, new oil fields will be continuously added as demand rises. This is part of the reason why we see years of consumption increasing and not decreasing.
Actually, it is rather odd that anyone could have thought that known resources pretty much represent what is left, and therefore predict dire problems when these have run out. It is a little bit akin to glancing into my refrigerator and saying: "Oh, you've only got food for three days. In four days you will die of starvation." No, in two days I will go to the super-market and buy some more food. The point is that oil will come not only from the sources we already know but also from many other sources which we still do not know.885 US Geological Surveys have regularly been making assessments of the total undiscovered resources of oil and gas, and writing in March 2000 they state: "Since 1981, each of the last four of these assessments has shown a slight increase in the combined volume of identified reserves and undiscovered resources."886 125

A2: Oil Scarcity

Oil is irrelevant – we will rely on other sources in the future.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 120

Sooner or later it will no longer be profitable to use oil as the primary fuel for the world. The price of oil will eventually increase and/or the price the other energy sources will fall. But societies do not demand oil as such, only the energy this oil can supply. Consequently, the question is not whether we leave a society for the coming generations with more or less oil, but whether we leave a society in which energy can be produced cheaply or expensively.
Let us put this slightly more simplistically. If our society - while it has been using up the coal and oil - simultaneously has developed an amazing amount of technical goods, knowledge and capital, such that this society now can use other energy sources more cheaply, then this is a better society than if it had left the fossil fuel in the ground but also neglected to develop the society.
Asking whether we will run out of oil in the long run is actually a strange question. Of course, in the long run we will undoubtedly rely on other energy sources. The reason why the question nevertheless makes us shudder is because it conjures images of energy crises and economic depression. However, in this chapter (as well as the next on raw materials) we will see that there are sufficient resources for the long-term future and that there are good reasons to expect that when the transition happens it will happen because it actually makes us even better off.
As Sheik Yamani, Saudi Arabia's former oil minister and a founding architect of OPEC, has pointed out: "the Stone Age came to an end not for a lack of stones, and the oil age will end, but not for a lack of oil."858 We stopped using stone because bronze and iron were superior materials, and likewise we will stop using oil, when other energy technologies provide superior benefits.859 120

A2: Oil Scarcity

The basis for the oil crisis is flawed – empirically proven.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 120-121

What actually happened to the oil crisis? We were told over and over that oil was getting scarcer and that now it would run dry. But it didn't happen. The oil crisis happened because the OPEC countries during the 1970s and the beginning of the 1980s were able to cut back on production and squeeze up prices. But it was never an indication of an actual scarcity. There was - and still is - oil enough.860 Nevertheless, ever since we started depending on fuel we have been worried about running out. For many, the first oil crisis in 1973 was exactly proof of the scarcity of resources.
One year earlier a book had been published that was to prove both immensely popular and influential - Limits to Growth. Using the new concepts of systems analysis and computer simulation, the book served as a focal point for analyses of our overconsumption and our course towards disaster in the 1970s. From seemingly endless scrolls of computer output the book showed us a variety of scenarios leading to catastrophe and breakdown. The book was based on two simple and basic arguments, that even today often seem to be the starting point for most resource discussions. Both points refer back to Malthus and questions of agricultural production, but they can be formulated quite generally. The first point supposes that many processes in social expansion grow; the second assumes that there are limits to this growth.
When you place a single bacterium in a jar with lots of nutrients it will quickly multiply. Suppose it can double each hour. After one hour the glass contains 2 bacteria, after two hours 4 bacteria, then 8, 16, 32, etc. This is an example of exponential growth. A doubling takes place for each time interval. This exponential growth constitutes the first assumption. Many human phenomena seem to have this character. Draw a graph of the number of people on Earth over time, and it will seem exponential. Money in the bank with a 5 per-cent interest rate will grow exponentially, doubling every fourteenth year. Actually everything that has stable growth rates constitutes exponential growth. The economy, the GDP, society's capital, the demand for goods, etc.
Limits constitute the second assumption. That Earth only contains a limited amount of resources is really just an obvious consequence of the fact that Earth is a sphere. This is why this idea is so enchanting. There is simply a limit to what the Earth can contain. If we use some of the resources there will be less left over for the next year, and sooner or later we will run out. There are, indeed, limits to consumption.
With the assumptions of exponential growth and limited resources we can easily make a doomsday prophecy. Exponential growth means that demand goes up and up, faster and faster, while limited resources set a sharp upper limit for the cumulative supply. And a doomsday prophecy was exactly what we got from Limits to Growth. Along with numerous other resources, Limits to Growth showed us that we would have run out of oil before 1992.8'1 As we know, that did not happen. Ehrlich told us in 1987 that the oil crisis would return in the 1990s.862 That did not happen either.
One might have thought that history would have made us wiser. But 1992 saw the publication of Beyond the Limits, the revised edition of Limits to Growth. Here, once again, we were told that our resources would soon run out863 Perhaps the first edition had been somewhat mistaken in the exact prediction of the year of resource exhaustion, but now we would soon see the problems cropping up. Beyond the Limits predicts once again that we will run out of oil (2031) and gas (2050). We might be able to postpone the pain somewhat, but gas consumption grows by 3.5 percent a year, i.e. consumption doubles every 20 years.864 Thus, every twentieth year we have to find as much new gas as our entire cumulated consumption up till now. "Thus is the nature of exponential growth," as the book puts it. 120-121

A2: Oil Scarcity

Price fluctuations prove – statistics claiming we are running out of oil are based off of artificial scarcity.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 121-124

We have long been told that we were running out of oil. In 1914 the US Bureau of Mines estimated that there would be oil left over for only ten years' consumption. In 1939 the Department of the Interior projected that oil would last only 13 more years, and again in 1951 it was again projected that oil would run out 13 years later.870 As Professor Frank Notestein of Princeton said in his later years: "We've been running out of oil ever since I've been a boy."87'
How should scarcity be measured? Even if we were to run out of oil, this would not mean that oil was unavailable, only that it would be very, very expensive. If we want to examine whether oil is getting more and more scarce we have to look at whether oil is getting more and more expensive872 Figure 65 shows that the price of oil has not had any long-term upward trend.
The oil price hike from 1973 to the mid-80s
was caused by an artificial scarcity, as OPEC achieved a consistent restraint to production.'" Likewise, the present high oil price is caused by sustained adherence to OPEC agreed production cutbacks in the late 1990s874 Thus, it is also expected that the oil price will once again decline from $27 to the low $20s until 2020875 This prediction lies well in the middle of the $17-$30 stemming from eight other recent international forecasts.876
The reason why it is unlikely that the long term trend will deviate much from this price is that high real prices deter consumption and encourage the development of other sources of oil and non-oil energy supplies. Likewise, persistently low prices will have the opposite effects.'"
In fact, if we look at the real price of gas at the pump (the consumer price) excluding tax, it stands at $1.10, on a par with the lowest prices before the oil crisis (Figure 64). This is because most of the gas price consists of refining and transportation, both of which have experienced huge efficiency increases.'"
At the same time Figure 66 demonstrates that we have more reserves than ever before. This is truly astounding. Common sense would tell us that if we have 35 years' consumption left in 1955, then we should have 34 years' supply left the year after.'" Yes, actually we should probably rather have 33 years' worth left because we consumed more oil in 1956 than in 1955. But Figure 66 shows that in 1956 - contrary to what common sense would indicate - there were more years of reserves even at a higher annual consumption881 Nor when we look at remaining years of supply does oil seem to be getting scarcer.
Notice how Figure 65 seems to indicate that oil consumption steadily increases (with the exception of the 1970s) just as predicted by the doomsayers: consumption is headed towards a breakdown. But look at Figure 67, where demand is depicted in the same diagram as the collected, known reserves. Here it is clear that the development in reserves by far out-paces development in demand.

A2: Past Can't Predict Future

The past is an effective guide to the future – discontinuities like new energy sources prevent sudden collapse
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 169-170

You may object that extrapolating a future from past trends of greater and greater abundance is like extrapolating – just before you hit the ground – that a jump from the top of the Eiffel Tower is an exhilarating experience. Please notice, however, that for a jump from the tower we have advance knowledge that there would be a sudden discontinuity when reaching the ground. In the case of energy and natural resources, there is no persuasive advance evidence for a negative discontinuity; rather, the evidence points toward positive discontinuities – nuclear fusion, solar energy, and discoveries of energy sources that we now cannot conceive of. Historical evidence further teaches us that such worries about discontinuities have usually generated the very economic pressures that have opened new frontiers. Hence, there is no solid reason to think that we are about to hit the ground after an energy jump as if from an Eiffel Tower. More likely, we are in a rocket on the ground that has only been warming up until now and will take off sometime soon.

A2: Known Reserves Predictions Prove scarcity

Known reserves is a meaningless indicator for predicting scarcity – it only reveals exploration costs
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 172

Known reserves" means the total amount of oil in areas that have been prospected thoroughly, quantities that geologists are quite sure of. Individuals, firms, and governments create known reserves by searching for promising drilling areas long in advance of the moment when wells might be drilled—far enough ahead to allow preparation time, but not so far ahead that the investment in prospecting costs will not obtain a satisfactory return. The key idea here is that it costs money to produce information about known reserves. The quantity of known reserves at any moment tells us more about the expected profitability of oil wells than it does about the amount of oil in the ground. And the higher the cost of exploration, the lower will be the known reserves that it pays to create. "Known reserves" are much like the food we put into our cupboards at home. We stock enough groceries for a few weeks or days—not so much that we will be carrying a heavy unneeded inventory that bulges the cupboard and ties up an unnecessary amount of money in groceries, and not so little that we may run out if an unexpected event—a guest or a blizzard—should descend upon us. The amount of food in our cupboards tells little or nothing about the scarcity of food in our communities, because as a rule it does not reveal how much food is available in the retail stores. Similarly, the oil in the "cupboard"—the quantity of known reserves—tells us nothing about the quantities of oil that can be obtained in the long run at various extraction costs.

A2: Demand Growth Projections Prove Energy Scarcity

Demand growth projections are misleading and absurd for projecting supply overshoot
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 175

A more "sophisticated"—and even more misleading—approach is to project present growth in demand, assuming the price will remain constant, and then compare that projection to known reserves, thereby indicating that demand will apparently outstrip supply very soon. This approach may be seen in figure 11-8. Even assuming that the growth in demand at present prices is reasonably estimated—and this would be difficult to do well—all that such a calculation would show is that price must rise in order to lower the demand and raise the supply until demand and supply meet. This basic economic way of looking at supply and demand is totally missing from figure 11-8.
Equally misleading is the assumption underlying figure 11-8 that there will be no developments in oil production or in other energy sources that will make future energy costs lower than they would be with the present state of technological knowledge.

A2: Metal Scarcity

We won't run out of metals – scarcity is negligible for 99.9% of metal use
Jerry **Taylor**, Director of Natural Resource Studies at the CATO Institute, "The Growing Abundance of Natural Resources" in "Market Liberalism: A Paradigm for the 21st Century", 19**93**, http://cato.org/pubs/chapters/marlib21.html

An examination of the price of 13 metals and minerals (aluminum, antimony, copper, lead, magnesium, manganese, mercury, nickel, platinum, silver, tin, tungsten, and zinc) shows a net 31 percent decline in real prices from 1980 to 1990. When indexed to wages, those price declines are even more dramatic. "Most of the minerals and metals at the turn of the century were five to ten times more expensive than they are today in terms of numbers of hours of work needed to purchase them."16
Declines in metal and mineral prices are reflected in the equally dramatic declines in raw material costs. From 1980 to 1990 the real price of glass fell 33 percent, cement prices fell 40 percent, metal price dropped 18 percent, and rubber prices declined by 40 percent.17
Examination of ultimately recoverable mineral resources indicates that we have only begun to tap the rich veins of the earth's abundance. U.S. Geological Survey data reveal that, if current consumption trends continue, recoverable mineral resources will last for hundreds and in many cases thousands and even tens of thousands of years.18 Physicist Herman Kahn and several colleagues concluded in 1976 that "over 95 percent of the world demand [for minerals] is for five metals (iron, aluminum/bauxite, silicon, magnesium, and titanium), which are not considered exhaustible." Another 4.85 percent of world mineral demand is for seven metals (copper, zinc, manganese, chromium, lead, nickel, and tin) that are "probably inexhaustible." Thus, 99.9 percent of all mineral demand is for metals virtually inexhaustible over any conceivable time horizon.19

Better technology and more efficiency proves that, like with aluminum, even if use increases, remaining years of consumption will too.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 140

Aluminum is the second most abundant metallic element after silicon - it makes up 8.2 percent of the Earth's crust. It is estimated that with the current identified reserves there is sufficient aluminum for 276 years of consumption at the present level.1014 But as we have seen with oil, gas and coal, this does not necessarily mean that the number of years left will reduce as time passes, even if we use more and more, because we get better at exploiting resources and finding more of them.
In Figure 77 we see that for the four most frequently used metals there is no sign of falling years of consumption; indeed, there is a slight upward trend. And this is despite the fact that we use ever more of the four raw materials. Aluminum consumption is today more than 16 times higher than in 1950, and yet the remaining years of consumption have increased from 171 years to 276 years.

Improved technology allows us to exploit even "impure" resources reserves, like iron.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 141-142

But again, technology has expanded such that today we can exploit ore with just 30-40 percent iron. It is estimated that the currently identified reserves leave us with 297 years of consumption at present levels. As we can see in Figure 77, there were actually many more years of consumption left in 2000 than in 1957, despite the fact that annual production has more than doubled. Actually, since the US Geological Service in 1957 estimated the world resource at 25 billion tons, we have used 35 billion tons, and now the reserve base estimate is at some 300 billion tons.

A2: Food Scarcity

Current famine proves nothing – real food prices are declining and agricultural production is massively increasing while using less land

Jerry **Taylor**, Director of Natural Resource Studies at the CATO Institute, "The Growing Abundance of Natural Resources" in "Market Liberalism: A Paradigm for the 21st Century", 19**93**, http://cato.org/pubs/chapters/marlib21.html

The disturbing, ongoing pattern of famine and drought in Africa and Asia has added credibility to the argument that the earth is approaching a point at which it will not be able to continue to feed the "teeming masses" of the planet. Yet by any analysis, this is a time of agricultural abundance unprecedented in the history of the world. Economist Thomas De Gregori observes that "if there is hunger in the world-and so there is, in abundance, even in wealthy countries-it is because of maldistribution of food, not insufficient global production.20 "Ten times as many people died of famine in the last quarter of the 19th century as have died of famine in the third quarter of the 20th century, despite our much larger present population and the massive engineered famines in Cambodia during the 1970s.21

An examination of 15 representative agricultural commodities (barley, broilers, carrots, cattle, corn, cotton, eggs, milk, oats, oranges, rice, sorghum, soybeans, wheat, and wool) reveals that real prices in the United States dropped by an average of 38 percent from 1980 to 1990. When indexed to wages, the price of those foodstuffs has declined 83 percent since 1950.22 Clearly, if the earth's agricultural productivity were being outpaced by voracious demand for food as a result of the population explosion, agricultural prices would be rising sharply rather than falling dramatically as the data indicate.

Likewise, it is clear that the agricultural output of the planet has increased exponentially over the past several centuries. Since 1960 technological advances in farm equipment, pesticides, fertilizers, irrigation techniques, bioengineering, and soil management have led to a doubling of world food production and 30 percent increases in farmland productivity.23 Technological advances have more than kept pace with the explosion in global population. Since 1948 world food production has surpassed population increases by about 1 percent a year.24 Although global population has doubled since World War II, world grain production has tripled.

The dramatic increase in the availability of foodstuffs occurred without any appreciable global increase in land committed to agricultural uses over the last 30 years. Since 1950, in fact, 200 million acres of U.S. farmland have been retired as a result of the unprecedented glut of agricultural commodities on the world market.

Multiple studies and indicators prove long-term food availability – your evidence is just crude correlation

Sheldon **Richman**, Senior Editor at the CATO Institute, Testimony on The International Population Stabilization and Reproductive Health Act (S. 1029), July 20, 19**95**, http://cato.org/testimony/ct-ps720.html

Food is abundant. Since 1948, according to the UN Food and Agriculture Organization and the U.S. Department of Agriculture, annual world food production has outpaced the increase in population. Today, per capita production and per-acre yields are at all-time highs. Prices of agricultural products have been falling for over 100 years. The average inflation-adjusted price of those products, indexed to wages, fell by more than 74 percent between 1950 and 1990. While Lester Brown of the Worldwatch Institute and the noted butterfly expert Paul Ehrlich predict higher food prices and increasing scarcity, food is becoming cheaper and more plentiful. That good news is due largely to technological advances (the "green revolution") that have provided better seeds, fertilizers, pesticides, and methods of farming. The only obstacles to agricultural progress are the impediments created by governments. Imagine what the world would be like today if the fertile farmland of the former Soviet Union or China or India had been in productive private hands operating in free markets for the past several decades. Since permitting market incentives in agriculture, India has been come a net food exporter and agricultural production in China has boomed.

Catastrophists argue that the bright past does not imply a bright future; they arbitrarily assert that mankind has crossed some fateful threshold. But the earth is capable of feeding many more people than are now alive. The late Roger Revelle of Harvard University (whom Gore claims as a mentor) estimated that Africa, Asia, and Latin America alone, simply by using water more efficiently, could feed 35 to 40 billion people--seven to eight times the current world population. And that assumes no change in technology--a groundless assumption, to be sure.

Those who annually predict imminent famine (while urging readers to subscribe to next year's publications) seize on any change as evidence that man's alleged strain on the biosphere is finally beginning to show. Thus, if the price of seafood rises, they announce that the seas are nearing exhaustion. They never consider the myriad other possibilities, such as the shift in diet from meat to fish, the decline of the Russian fishing industry during the dissolution of the Soviet Union, or the "tragedy of the commons" associated with the lack of property rights in the oceans and lakes.

The most telling indication of the trend in food production is the presence of a farm lobby in every industrial capital. Those lobbies spend millions of dollars a year to persuade their governments to hold food prices up and food supplies down. They apparently don't expect help from nature.

A2: Food Scarcity

There is no inherent limit on food production which is driven by rusing productivity
Jan **Narveson**, Professor of philosophy at the University of Waterloo in Ontario, Free Inquiry, "Overpopulation? Fiddlesticks!" Volume 24, Issue 5, August/September 20**04**, Proquest

How could the population pessimists have been so wrong? To begin with, there never was any real basis for Malthus's conjecture about the relationship of food supply to population. That he should have thought that there was reflected what we might call the "materialist fallacy." It consists in thinking that wealth is somehow a pile of stuff or "material" rather than what it really is, the effective human utilization of our resources. The materialist idea is that we are taking from this pile, diminishing it; as we "consume" more, there is less left. Eventually the pile must shrink to zero-yikes!
But the idea is totally wrong. Consider the most basic "stuff" of all-food. How much food can a given piece of land produce? Malthus thought the amount was fairly small and could only be improved a little bit. In fact, it is very large; moreover, there is no real way to say how much food you "can" grow on it using advanced technologies. Farmers all over the world are becoming more efficient. American Midwestern farmers grow several times as much corn from one acre as they did a hundred years ago. Improved varieties of grain, better fertilizers, and many other things go into the equation. The idea that eating is a matter of slowly "using up" something that we must eventually run out of is a sheer misconception.

Food production will continue to grow indefinitely
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 5

Food. Contrary to popular impression, food production per capita has been increasing for the half-century since World War II, the only decades for which we have acceptable data. We also know that famine has progressively diminished for at least the past century. Average height has increased in developed countries in recent centuries, a sign that people are eating better. And there is compelling reason to believe that human nutrition will continue to improve into the indefinite future, even with continued population growth.

Food production is increasing faster than population over time – the long-term trend is cheaper food
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 88

Let's examine the very long-run price trends for food, just as we did for copper in chapter 1. Figure 5-2 shows that the real price of wheat—the market price adjusted for inflation—has fallen over the long haul despite the great increase in demand due to both a growing world population and rising in-comes. The rise in food output was so great as to cause grain to become cheaper despite the large increases in demand. More startling still, figure 5-2 shows how the price of wheat has fallen by another measure—relative to wages in the United States.
How did total output, and productivity per worker and per acre, gain so fast? Food supply increased because of agricultural knowledge resulting from research and development that was induced by the increased demand, together with the improved ability of farmers to get their produce to market on better transportation systems. (These sentences are a lightning-fast summary of forces that take many books to document well.)
This all-important historical trend toward cheaper food, which probably extends back to the beginning of agriculture, implies that real prices for food will continue to drop—a fact that dismays American farmers and causes them to tractorcade to Washington.

Even with current yields we can increase food available for consumption, and yields are increasing, not decreasing
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 97

More generally, with present technology and without moving toward the much higher yields found under experimental conditions, the world can more than feed any foreseeable population increase. There are a host of already well-proven techniques that could boost production immediately, including better storage facilities that would cut the perhaps 15-25 percent loss to pests and rot every year, improved production devices such as vacuums that suck up bugs instead of killing them with pesticides; and the host of individually small innovations that one can read about very month in farm magazines. Widespread adoption adds up to steady improvement, and yields seem to be accelerating rater than tapering off. An example of the long-term increases in productivity is shown in figure 6-2.

A2: Food Scarcity

There's no limit to agricultural productivity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 102-104

Nor is this any "ultimate" limit. Rather, these gains are just the result of research over the past few decades, and there is no reason to think that future research in the next century or the next seven billion years could not greatly multiply productivity. It is likely that before the world gets to 500 billion people, or even to 10 billion, the maximum output per acre will be increased much beyond what PhytoFarm achieves now. The discussion so far does not take account of such existing technology as bovine growth hormone, which has no proven effect on humans yet greatly increases the yield of milk products.' Nor does the above assessment reflect such innovations as genetically engineered plants, which will surely produce huge commercial gains in the next century.10 For example, rapeseed output can already be boosted 15 to 30 percent with genetic engineering."
The possibilities already shown to be feasible are astounding. For example, one might insert into a potato genes from a moth that affect the potato's coloring.12 Other genes might make proteins in a potato with the full complement of amino acids that humans need—giving the benefits of meat and potatoes by eating the potatoes alone. Please keep in mind that this technology has been developed after only a few decades of work on the topic, and only a little more than a century after the first scientific knowledge of genetics. Potential progress in the future—even within the next few decades and centuries—is awesome. Doomsaying forecasts about population growth outstripping the food supply that take no account of these possibilities surely are seriously inadequate.

New methods of production infinitely extend the ability to feed a growing population
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 421

How much capacity still exists for enhancing land through irrigation, new seeds, fertilizer, and new farming methods? In chapter 6 we saw that the capacity is vast, much much greater than would be required to handle any presently imaginable population growth. The use of traditional farmland is no longer the only way to produce food. And of course our capacity to feed our-selves is not limited to what we now know how to do; it will certainly increase greatly as we make new technological discoveries. No matter how the increase in capacity occurs, however, the key element in developing and harnessing the capacity to replace land with technology is the pressure of an increased demand for food—which arises from an increased world income, population growth, and improved markets so that farm produce can be bought and sold without the prohibitive transportation costs still found in most very poor countries.
But what about "ultimately"? People worry that the process "cannot go on forever."
The earlier chapters on natural resources and energy argue that it makes sense to discuss the future that we can presently foresee—twenty years, one hundred years, even five hundred years from now. To give much weight to an even more distant time—so far in the future that we do not even give it a date except that it is a figure with several zeros in it—is not sensible decision making. Furthermore, there is strong reason to believe that "ultimately"—whatever that term means—natural resources will be less scarce rather than more scarce. And there is no reason to think that land is different in this respect.

A2: Food Scarcity

Even current technology and land resources can feed 40 billion people
Zey in '98

(Michael, Professor of Management in the School of Business Administration at Montclair State University, "Seizing the Future: The Dawn of the Macroindustrial Era", p. 161-162)

The population of the world is currently around 5 billion, and it is expected to grow to 8.5 to 11 billion sometime in the next century. Colin Clark, former director of the Agricultural Economic Institute at Oxford University, classified world land types by their food-raising capabilities and claimed that if all farmers were to use the best food-growing methods, enough food could be raised to provide an American-type diet for 35.1 billion people, about seven times the present population. The American diet is a very rich one, featuring high-cholesterol foods, meat, and other delicacies. If the goal is to provide the world's members with a more modest Japanese diet, we could possibly feed three times again as many, or twenty-two times the current world population.
Roger Revelle, former director for the Harvard Center for Population Studies, has determined that world agricultural resources as they now stand can provide an adequate diet (around 2500 calories per day) for 40 billion people. Surprisingly, according to Revelle, we can feed these people with an average world yield per acre one-half that presently produced in the American Midwest.
Revelle has estimated that the less developed continents are capable of feeding 18 billion people, or six times their present population. Africa alone, according to Revelle, has the capacity to feed 10 billion people, twice the number of the present world population and more than twenty times Africa's 1980 population. Revelle also believes that agricultural yields in Asia could be greatly increased and reflects some sentiment that India alone could feed the entire population of the world.

Plenty of available land for growing food
Zey in '98

(Michael, Professor of Management in the School of Business Administration at Montclair State University, "Seizing the Future: The Dawn of the Macroindustrial Era", p. 163)

According to a Food and Agriculture Organization study, we have not even begun to utilize available land. The organization estimates that there are in the world nearly 8 billion acres of arable land lying idle – four times that now being cultivated, just waiting for humanity's ingenuity and imagination to transform them into farms and gardens. Tropical islands, for instance, allow multiple cropping. If that fact is taken into account, then the fourfold potential increase balloons to tenfold.

Agricultural biotechnology solves hunger
Zey in '98

(Michael, Professor of Management in the School of Business Administration at Montclair State University, "Seizing the Future: The Dawn of the Macroindustrial Era", p. 165)

The impact of biotechnology on agriculture can and will be dramatic: It will obliterate hunger and even force the human species to reconceptualize issues like scarcity and abundance. Crops will be grown that will be resistant to disease and drought, tolerant of herbicides and salt, and immune to attack by insects. Humanity will transform agriculture and liberate it from the ills that have plagued it from time immemorial.

A2: Monocultures (One Crop Vulnerability)

Crop varieties are concentrated globally but locally people consume more types of food than in the past which decreases susceptibility to monoculture famines
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 107-108

DURING the past ten thousand years of agriculture, humans have concentrated their farming efforts on only a few descendants of the many wild varieties that were formerly eaten. As of the 1970s, the annual production (millions of metric tons) of the top crops was: wheat, 360; rice, 320; maize ("corn" in U.S.), 300; potato, 300. Barley, sweet potato, and cassava were below 200 tons, and no other crop was more than 60 tons.22 From this data, Jack Harlan and others inferred that the food situation had become more fragile than earlier in history, more vulnerable to catastrophic disaster with the failure of a single crop. This worry became one of the cliches of the 1970s, thrown at anyone who pointed out that nutrition had been improving in the world.
The idea that fewer crops means more fragile food supplies is contradicted by many centuries of human experience: the data show that famine mortality has fallen rather than risen. And when we examine the proposition analytically, it seems unwarranted. First, we notice that though the world's foods have become more concentrated in fewer varieties over the centuries, this does not imply the same for local consumption. The diet of an Indian villager is surely more diverse now tha<u>n in the past</u> (when a single locally grown crop constituted the overwhelming proportion of every person's diet), because villagers now have access to foods from outside the village, and income to purchase them. Indeed, one need only consider one's daily intake to see how much the sources of our food are much more diversified from all over the world than in past centuries, largely because of the improvement of transportation and of storage techniques such as refrigeration. The data on the size of grocery stores and the number of products carried in them belie the assertion that "the supermarket and quick-food services have drastically restricted the human diet in the U.S.""
Because of everyone's greater access to more widespread sources of food, chances are t<u>hat even if two of the top four crops were completely wiped out for an entire year, there would be less effect upon people's nutrition than if only one crop had been wiped out in a past century</u>, if only because a large proportion of our grains are fed to animals and could be redirected to humans. Reduction in agricultural variety would seem to be just one more false scare, which may have arisen simply because people cannot believe that such good things can happen without our having to pay nature a penance for our blessings.
In a telling observation, the same excellent scholar who produced the data adduced above but worried about reduction in variety noted that "weeds are species or races that thrive in man-made habitats," and "[W]hat species thrives in man-made habitats better than homo sapiens? We are the weediest of all" Just so. And our weedlike survival capacities increase from generation to generation rather than diminish, despite (or because of) such changes as reduction in the number of species cultivated in the world.

A2: Modern Farming Not Sustainable

Farm productivity is rising along with nutritional value while using less land and maintaining soil quality
Tom **Randall**, Managing Editor of Environment and Climate News, Environment News, "Sustainable silliness", May 1, 20**00**, http://www.heartland.org/Article.cfm?artId=9787

As more efficient farming techniques make it less necessary (and less profitable) for many farmers to remain in business, it's not surprising that the country is losing farmland. It's also not a crisis.
According to the U.S. Farm Bureau, the U.S. has lost about 20 percent of its farm land since the 1952 peak of 1.2 billion acres. Yet the productivity of our agriculture has soared. Rapid advances in agricultural technology are enabling us to grow more food on less land. This is a good thing.
An October 1999 Department of Agriculture report noted that "Crop land converted to urban uses is small relative to total crop land and is expected to remain so well into the next century."
As for the quality of farmland, botanist Raven told the Chicago Tribune that the U.S. has lost 25 percent of its topsoil through over-cultivation, and he claims we've made even more land unusable through over-irrigation. He neglects to mention that much farming is now done by the "no-till" method, which actually enriches top soil; nor does he mention advances in drip irrigation, which uses far less water, or our continuing development of drought-resistant plants.
Bioengineering of crops promises even more food of higher nutritional value, at lower costs, using less fertilizer and pesticides--perhaps even food containing vaccines--all grown on less land and under less-favorable conditions.

Sustainability isn't a problem – land can be intensively farmed indefinitely
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 133

Nor is the problem of "sustainability" the bogey it is made out to be. Land can be used indefinitely, even on an intensive basis, without loss of fertility. This may be seen in the Morrow Plots at the University of Illinois, the oldest experimental agriculture station in the United States (my favorite place to take visitors in the years I taught there). Starting in 1876, corn has been planted every year without any fertilizer, and the yields are visibly scrawny. But land that has been planted every year but rotated among corn and other crops retains excellent fertility, the corn towering above the no-fertilizer-no-rotation yields, with no observable loss of soil fertility. Crops using commercial and organic fertilizer both do as well as the rotation crops. And crops using both rotation and fertilizer do best of all.15

A2: Famines Prove Food Scarcity

Famines are always political – not resource driven

Jan **Narveson,** Professor of philosophy at the University of Waterloo in Ontario, Free Inquiry, “Overpopulation? Fiddlesticks!” Volume 24, Issue 5, August/September 20**04**, Proquest

The Malthusians didn't know what hit them. Actually, some of them still don't-we still hear them muttering that we have "too many people." But there comes a time when the facts clobber you in the face with such force that it's impossible not to notice. Despite all the claims, when starvation occurs, it is due not to agriculture and the limited "carrying capacity" of the planet but to politics. To be more precise, there are two sorts of starvalions: little and big. In the little ones, natural disasters beset a few thousand unfortunate people, creating short-term emergencies. Then the rest of us rush them supplies. If the local governments are any good, the supplies actually get to those who need them and lives are saved. If the local governments are corrupt, incompetent, or inhuman, the supplies are pilfered, and those in need don't receive them. In the big cases, governments actually cause the starvation. In the twentieth century, government-made starvations were the only kind there were. For example, Maoist China starved more than thirty million people. When communal agriculture was disassembled and Chinese farmers could work the way they wanted to, China increased its food output by 50 percent in a single decade and even began exporting food to the USSR in the 1980s. Bad politics is what you need for starvation. For adequate food production, you need free farmers and markets. The earth isn't the problem. Its political leaders are.

Uniqueness: Famine Decreasing

Food is becoming increasingly abundant – hunger is decreasing
Goklany in '02

(Indur M., D&D Foundation Julian Simon Fellow at the Political Economy Research Center, CATO Policy Analysis #447, "The Globalization of Human Well-Being", August 22, http://www.cato.org/pubs/pas/pa447.pdf)

<Concerns about the world's ability to feed its burgeoning population have been around at least since Malthus's Essay on Population, published 200 years ago. Initially the concern was global. But by the 1950s and 1960s, despite the privations of the Great Depression and World War II, it seemed that the problem, if any, would be restricted to developing countries. Several neo-Malthusians, such as Paul Ehrlich, author of Population Bomb,45 and the Paddock brothers,46 confidently predicted apocalyptic famines in the latter part of the 20th century in the developing world. But remarkably, despite an unprecedented increase in the demand for food fueled by equally unprecedented population and economic growth, the average inhabitant has never been better fed and less likely to be hungry and undernourished. Between 1950 and 2000, world population increased by 140 percent and per capita income by more than 170 percent. Yet, because of the enormous increase in agricultural productivity and trade, the real price of food has never been lower. Low food prices ensure that the benefits of increased production are distributed broadly and food surpluses flow voluntarily to deficit areas. As a result, worldwide food supplies per capita have improved steadily during the past half century. Between 1961 and 1999, the average daily food supplies per person increased 24 percent globally, from 2,257 calories to 2,808 calories.47 The increase was even more rapid in developing countries where it increased 39 percent, from 1,932 to 2,684 calories. The improvements for Indians and Chinese—40 percent of humanity—are especially remarkable. By 1999, China's average daily food supplies had gone up 82 percent to 3,044 calories from a barely subsistence level of 1,636 calories in 1961 (a famine year). India's went up 48 percent to 2,417 calories from 1,635 calories in 1950–51.48 However, consistent with Figure 1, which shows per capita daily food supplies rising with wealth, improvements in per capita food supplies have been slower where for whatever reason—war, political instability, or failed policies and institutions—economic development has lagged. For instance, between 1961 and 1999 average daily food supplies per capita in Sub-Saharan Africa increased a paltry 6 percent from 2,059 to 2,195 calories.49 The decline in food supplies in Eastern Europe and the former Soviet Union (EEFSU) after the collapse of communist regimes there only underscores the importance of economic development.

To put the improvements in per capita food supplies into context, the United Nations' Food and Agricultural Organization estimates that an adult in developing countries needs a minimum of 1,300 to 1,700 calories per day merely to keep basic metabolic activities functioning when at rest in a supine position. Food intake below those levels results in poor health, declining body weight, and physical and mental impairment. If one allows for moderate activity, then the national daily average requirement increases to between 2,000 and 2,310 calories per person.50

Therefore, since 1961, developing countries' available food supply has, on average, gone from inadequate to above adequate. But these averages mask the fact that hunger still persists today since many people unfortunately have below-average food intake. Nevertheless, between 1969–71 and 1997–99 the number of people suffering from chronic undernourishment in developing countries declined from 920 million to 790 million, or from 35 percent to 17 percent of their population, despite a 76 percent growth in their population.51 Thus gaps between developing and developed countries in hunger and malnourishment have, in the aggregate, declined in absolute and relative terms. But the trends for Sub-Saharan Africa tell a somewhat more nuanced tale. Between 1979–81 and 1997–99, the share of population that was undernourished declined from 38 to 34 percent, but the absolute numbers increased from 168 million to 194 million.52>

FOOD SUPPLIES ARE INCREASING AND PEOPLE ARE EATING MORE ALL AROUND THE WORLD
SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFIED 20**05**

[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

Food is an especially important resource. The evidence is particularly strong for food that we are on a benign trend despite rising population. The long-run price of food relative to wages is now only perhaps a tenth as much as it was in 1800 in the U. S. Even relative to consumer products the price of grain is down, due to increased productivity, just as with all other primary products.

Famine deaths due to insufficient food supply have decreased even in absolute terms, let alone relative to population, in the past century, a matter which pertains particularly to the poor countries. Per-person food consumption is up over the last 30 years. And there are no data showing that the bottom of the income scale is faring worse, or even has failed to share in the general improvement, as the average has improved.

A2: Farmland Scarcity

New technologies increase productivity and make more land usable – we won't run out
Jerry **Taylor**, Director of Natural Resource Studies at the CATO Institute, "The Growing Abundance of Natural Resources" in "Market Liberalism: A Paradigm for the 21st Century", 19**93**, http://cato.org/pubs/chapters/marlib21.html

Moreover, there is good reason to believe that the planet can feed tens of billions of people for many generations to come. Suitable agricultural land makes up 24 percent of the total ice-free landmass of the globe, well over twice the amount cultivated in recent decades and more than triple the acreage cultivated in any given year.26 Moreover, a great deal of the world's cropland is underused or cultivated using low-yield technologies and practices similar to those used in this country in 1910. Obviously, agricultural productivity will skyrocket as high-yield technologies continue to advance throughout the developing world.
Yet even those expansive limits are not fixed. Agricultural history is largely defined as the transformation of land unsuited for cultivation into productive cropland. Nobel laureate Theodore Schultz observes that "the original soils of western Europe, except for the Po Valley and some parts of England and France, were in general very poor in quality. As farmland, these soils are now highly productive. A substantial part of the productivity of farmland is manmade by investments in land improvements."27 Political economist David Osterfeld points out that "much of the American Midwest was forest and swampland. No account of arable land in, say, 1800 would have included it. Now, after it has been cleared and drained, it is among the most fertile lands in the world. And the elimination of the tsetse fly would open up to cultivation about 200 million hectares of African land, an area larger than the total cropland in the United States."28 Productive farmland is not some sort of finite given; it is, instead, a function of agricultural skill and technology, two "resources" that have been expanding rapidly over the centuries and exponentially over the past 80 years.
Simply increasing the efficiency of water use in developing nations could provide enough advances in productivity to support a global population of 35 billion to 40 billion people, between seven and eight times the current population of the world.29 And then there is the coming revolution in biotechnology, a science well on its way to producing crops that are able to resist drought, insects, disease, and salinity and thrive in the harshest soils and previously inhospitable environments. Because of the projected low costs of those new products, biotechnology will probably have its greatest impact in the developing world, enabling poor farmers to take full advantage of the agricultural revolution and to afford the relatively costly inputs required to make high-yield farming economical.

Agricultural land isn't fixed – its infinite
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 5-6

Land. Agricultural land is not a fixed resource. Rather, the amount of agricultural land has been increasing substantially, and it is likely to continue to increase where needed. Paradoxically, in the countries that are best supplied with food, such as the United States, the quantity of land under cultivation has been decreasing because it is more economical to raise larger yields on less land than to increase the total amount of farmland. For this reason, among others, the amount of land used for forests, recreation, and wildlife has been increasing rapidly in the United States – hard to believe, but substantiated beyond a doubt.

Hydroponic farming solves carcity of farmland
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 100-101

Some radical improvements for the long run have already been well tested, Id are not just a desperate last resort. In the environs of Washington, D.C., where I now live, there are a dozen or so small farms that raise vegetables hydroponically and sell them through supermarkets at premium prices be-cause of their high quality. And this is commercially viable without subsidies from the government or from other divisions of a large firm. That is, this is not futuristic stuff, but right-now technology. You can read the names of the firms on the produce at the local supermarket. In fact, hydroponics is sufficiently practical that at least one supermarket has built a 10,000-square-foot vegetable garden inside its store to provide the freshest possible vegetables to its customers.' If the scarcity of farmland—as measured by the price of farmland—were to increase greatly, the potential production by hydroponic farming is enormous.
In the brief time since the first edition, the capacity of food-factory production has expanded to a degree almost beyond belief. On a space of perhaps 36 square meters—that is, a "plot" six meters or 18 feet on each side—with the use of artificial light, enough food can be raised to supply the calories for a single person, day in and day out.3 (A less conservative estimate is that a plot 10 feet square will suffice. That is, a large bedroom in an ordinary U.S. house, 20 feet by 20 feet, would contain enough area to feed a family of four.)

You might think that though this is possible in a laboratory, practical development might be far in the future, or might never become practical—the way people think of fusion energy now. But farming at almost this level of land efficiency is already in commercial operation. 57

A2: Farmland Scarcity

Land is infinite
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 134-135

Many people consider land to be a special kind of resource. But like other natural resources, land is the result of the human creative process, as discussed in chapters 1-3. Though the stock of usable land seems fixed at any moment, it is constantly being increased—at a rapid rate in many cases—by the clearing of new fields or the reclamation of wasteland. Land also is constantly being enhanced by increasing the number of crops grown per year on each unit of land, and by increasing the yield per crop with better farming methods and with chemical fertilizer.
Last but not least, land is created anew where there was none. For example, much of Holland originally belonged more to the sea than to the land. "Ac-cording to strict geographical determinism, one would expect to find there nothing but a fever-ridden delta and lagoons, the undisputed domain of sea fowl and migratory birds. Instead, we find a prosperous and densely-peopled country, with in fact the highest densities of population in Europe."16 The new land was won by diking and draining. "This is essentially a triumph of human will, it is the imprint of civilization on the landscape."17 A hundred years ago someone said of the Netherlands, "This is not soil, it is the flesh and blood and sweat of men."18

The risk of farmland loss are overstated
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 139-140

These and similar programs in seventeen other states are founded on the assumption that the United States is losing farmland at an unprecedented rate, and that the farmland is needed to stave off hunger in the future. Both those assertions have now been wholly disproven—and acknowledged to be so by the U.S. Department of Agriculture, which originally raised the alarm. That is, even the original purveyors of the false facts about the "vanishing farmland crisis" agree that the widely reported scare was without foundation.'
The relevant data are as follows:
Figure 9-1 shows that of the 2.3 billion acres in the United States as of 1987, all the land taken up by cities, highways, nonagricultural roads, rail-roads, and airports amounts to only eighty-two million acres just 3.6 per-cent of the total.2 Clearly there is very little competition between agriculture on the one side, and cities and roads on the other.
Concerning the trends: from 1920 to 1987, land in urban and transportation uses rose from 29 million acres to 82 million acres—a change of 2.3 percent of the total area of the United States.' During those fifty-seven years, population increased from 106 million to 243 million people. Even if this trend were to continue (population growth has slowed down), there would be an almost unnoticeable impact on U.S. agriculture, just as in past decades (see fig. 9-2).
Concerning the notion that the United States is being "paved over," as of 1974, the U.S. Department of Agriculture's official view was that "we are in no danger of running out of farmland."4 But then there occurred a bizarre incident in which the failure of the press and television is undeniable and inexcusable. Even the original purveyors of the false facts have 'fessed up and now agree that the widely reported scare was without foundation.

No fixed quantity of farmland
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 415

Reduction in the amount of land available to the farmer causes little hard-ship if previously he was not farming all the land that was available (though he may have to change his farming practices so as to cultivate the same land more intensively). The other side of the coin is that when farmers need more land they make more land, as we have seen in chapter 8. The notion of a fixed supply of farmland is as misleading as is the notion of a fixed supply of copper or energy. That is, people create land—agricultural land—by investing their sweat, blood, money, and ingenuity in it.

A2: Farmland Scarcity

Increasing productivity outpaces the need for new farmland
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 423-424

Given that agricultural productivity per acre in presently developed countries is increasing faster than population growth (as well as faster than the growth in total crop production) and given that we can expect all countries to eventually reach this productivity level and go far beyond, it follows that the total amount of land used for crops in poor countries will eventually decline, as it has been declining in the United States. (This decline has been occurring even as U.S. exports of grain have been increasing over the decades, and there-fore the trend of less land feeding more people holds even more strongly if we consider only domestic U.S. food consumption.) This suggests that in the future there will be a larger amount of land available for recreation because less land will be used for crops.
For those interested in investment tips: The foregoing implies that, in comparison with recreational land, agricultural land may not be a good investment for the very long run. This contrasts with a perception that has existed since the beginning of agricultural history, to wit, that flat land accessible to markets is more desirable than hard-to-reach hilly or mountainous land—that Illinois land is more valuable than Tennessee land, say. The land of the Canaanites was said to be desirable in the Bible because it was "spacious," and good for agriculture. But in the future, land will be desirable because it is beautiful and interesting for recreation. (Don't rush out today and sink the family fortune into hilly land, however. The long run I am talking about may be one hundred or more years into the future.)
Are these statements that agricultural land is becoming less scarce, and recreational land more available, just science fiction? It seems to me that a fair-minded person who examines agricultural history must conclude that the facts are more consistent with the view that a greater demand for food leads eventually to a higher output per person than with the common view that it leads to a lower output per person. The simple Malthusian speculation about population growth leading to diminishing returns is fiction; the induced in-crease in productivity is the scientific fact.
Do additional people increase the scarcity of land? In the short run, before adjustments are made—of course they do. It is true with land just as with all resources. The instantaneous effect of adding people to a fixed stock of land is less land to go around. But—and this is a main theme of this book—after some time, adjustments are made; new resources (new lands in this case) are created to augment the original stock. And in the longer run the additional people provide the impetus and the knowledge that leave us better off than we were when we started. (The theory is discussed at greater length in chapter 4.) How you weigh the short-run costs against the intermediate-run and longer-run benefits is a matter of values, of course.

Increasing population means less farmland will be necessary
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 415-416

Please re-read the preceding sentence carefully. It does not say that the proportion of the population working in agriculture is going down in the richer countries. Rather, it says something much stronger. The absolute number of farm workers is going down, and consequently the absolute amount of land per farm worker is going up in these countries. This fact makes it very clear that the combined increases of income and population do not increase "pressure" on the land, in contrast to popular belief and opposite to the state of affairs in poor countries that have not yet been able to adopt modern farming methods.
The extrapolation of this trend for the future is extraordinarily optimistic: As the poor countries get richer, and as their rate of population growth falls, they will reach a point at which the number of people needed to work in agriculture to feed the rest of the population will begin to fall—even though the population gets bigger and richer. So much for a long-run crisis in agricultural land caused by population growth!
Let us push this idea even further, in order to see how a simple-minded extension of trends can lead to absurd conclusions. A continuation of the present trend in the United States, carried to the same absurdity as the night-mare described earlier, would eventually have just one person farming all the land in the United States and feeding everyone else.
Where will this benign trend stop? No one knows. But as long as agriculture is pointed in this economically desirable direction, we need not be concerned about how far the trend will go—especially as there apparently are no technological or environmental forces to stop it.

A2: Farmland Scarcity

Intensive practices solve farmland scarcity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 420

The foregoing examples show that in the poorer agricultural countries the creation of new land has been the source of most of the long-run increase in agricultural output which has kept up with population growth. But what will happen when there is no more "wasteland" to be converted into agricultural land? Not to worry; we can be quite sure this will never happen. As the available land for crops becomes more and more costly to transform into cropland, farmers will instead crop their existing land more intensively; this practice becomes more profitable than dipping into the pool of undeveloped land, because the unused land is relatively inefficient. The enormous possibilities in this direction are described in chapter 4.
Evidence for this process is found in the international statistics showing that, when population density is higher, the proportion of land irrigated is higher too.21 This process may be seen particularly clearly in Taiwan and India, where, after farmers exploited a large proportion (but by no means all) of the unused land, irrigation began in earnest.

OUR ABILITY TO CULTIVATE MORE LAND FOR FOOD CHECKS BACK PREDICTIONS – AS DOES GENETIC MODIFICATION
KRAUTKRAEMER 2005
[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]

Other major natural resource sectors show increasing productivity and declining prices. Malthus's prediction about population and food supply was inaccurate: food production has exceeded population growth. For much of the last two centuries, the increase in food production was the result of bringing more land under cultivation and farming existing land more intensively. The substitution of tractor power for draft animals made more agricultural production available for human consumption—in the 1920s, the production from about one-quarter of United States cropland was used to feed draft animals (Johnson 2002)
Corn yield per hectare was relatively constant from 1800 to 1930, when hybrid corn was introduced. Corn yield had increased about 50% by 1950; it tripled between 1950 and 1984. Wheat yields per acre in the United States were relatively constant from 1800 to 1950 and then more than doubled between 1950 and 1984 (Johnson 2002). Average cereal grain yields in the United States during 1996-1998 were 22% higher than during 1986–88; the increase in cereal grain yields for the world was a little lower at 17% (World Resources Institute 2000). The increases in agricultural productivity have increased food availability and lowered prices. The prices of maize, rice, soybeans, wheat, and beef are about one-half of their 1960 levels (WRI 1998). See Table 2 and Figure 7.

A2: Arable Land Scarcity

Arable land increasing
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 128

Not true. The world is not "losing ground" on a net basis, as this chapter shows. Of course, arable land in some places is going out of cultivation because of erosion and other destructive forces, as well as because productivity elsewhere is increasing and the land is no longer needed (for example, in Wisconsin and the southeastern states of the United States). But taken as a whole, the amount of arable land in the world is increasing year by year, in flat contradiction to the clear implications of the statements quoted above. Indeed, Eckholm now says – and it is good to hear – "My book did not assert that the world as a whole is losing arable land on a net basis, nor did I intend to imply that," though as the quotations above show, journalists and environmentalists (and I) did read a clear net-loss message in Eckholm's book.

Arable land is increasing – we have readily convertible farmland
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 129

As to the meanings of "arable" and "suitable for crops": Here again, economics cannot be separated from semantics. At one time most of Europe could not be planted, because the soils were "too heavy" When a plow was invented that could farm the heavy soil, most of Europe suddenly became "arable" in the eyes of the people who lived there. Most of Ireland and New England originally were too hilly and stony to be farmed, but with backbreaking toil stones were removed and the land became "suitable for crops." In the twentieth century, bulldozers and dynamite have pulled out stumps that kept land from being cropped. And in the future, cheap water transportation and desalination will transform more of what are now deserts into "arable" lands (just as happened with much of California). The definitions change as technology develops and the demand for land changes. Hence, any calculation of "arable" land should be seen for what it is—a rough temporary assessment that may be useful for a while but has no permanent validity.
"You can even make agricultural land out of Mount Everest, but it would cost a fortune to do so," is a common reply to such optimism by those who worry that we are running out of land. But in many parts of the world, new land can be bought and cleared right now for amounts that are considerably below the purchase price of good developed land. Furthermore, the cost of acquiring and clearing land nowadays is less than it was in the past, when tree cutting, stump pulling, and irrigation-ditch digging had to be done by hand or with animal power. New areas are made habitable for agriculture as well as for urban activity with air conditioning.*

A2: Arable Land Scarcity

Best data shows global increases in arable land
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 130-131

Eckholm and others provide frightening anecdotes aplenty about how the world is "losing land" to deserts, dust, overgrazing, woodcutting, and salting due to irrigation—often the stories are travelers' impressions and other casual evidence. But statistics they do not give. "Ideally, a book on the ecological undermining of food-production systems would include detailed national statistics. Unfortunately, such comprehensive data are not available," Eckholm says. But in fact comprehensive data are available. And these data contradict the picture suggested by the anecdotes.
Joginder Kumar laboriously collected and standardized the first set of data on land supply and use throughout the world. His finding: Nine percent more total arable land in 1960 than in 1950 in the eighty-seven countries for which he could find data; these countries account for 73 percent of the total land area of the world.$ More details on this impressive gain of almost 1 percent per year may be found in the top panel of table 8.1. Some of the places where the quantity of cultivated land is going up may surprise you—India, for example, where the amount of cultivated land rose from 1,261,000 to 1,379,190 square kilometers between 1951 and 1960.9
The trend that Kumar found from 1950 to 1960 still continues. The UNFAO now has collected data back to the 1960s showing that there was a rise in "arable and permanent cropland" in the world as a whole during the period 1961–1965 to 1989 from 10.41 percent to 11.03 percent of Earth's dry-land area, which represents an increase of 5 percent in arable area for the roughly twenty-five-year period (see table 8-1); the data for agricultural (arable plus pasture) are comparable, as the bottom panel of table 8-1 shows. Furthermore, the gain in the developing countries is particularly significant and heartening.
We begin, then, by taking notice of the fact that the amount of arable land in the world—and especially in the poor and hungry countries—is increasing, rather than decreasing as the popular press would have it. Nor should we worry about diminishing returns in the long run due to successively poorer land being brought into use, because average yields per acre are increasing.

A2: Land Scarcity

Artificial islands in the macro industrial era solve land shortages
Zey in '98

(Michael, Professor of Management in the School of Business Administration at Montclair State University, "Seizing the Future: The Dawn of the Macroindustrial Era", p.50-52)

The Chunnel is indeed a marvel of the Macroindustrial Era. However, humanity's quest to reshape the Earth is not limited to digging under-ground. There exist nascent plans to expand the very land base upon which the species lives.

As we have seen, in order to overcome the natural limits of land and space, Japan has begun to dig underground to enlarge its geographic possibilities. Its other response to the density problem, however, the construction of artificial islands, exemplifies the very essence of the macroindustrial spirit.

Japan has budgeted $200 billion for a project known as Ocean Communications City. The country's first city on an artificial island, Ocean City has daunting ambitions and dimensions. It will stand in 670 feet of water out at sea, seventy-five miles from Tokyo. The city itself will stretch nine square miles on a platform rising 260 feet above water's surface.

Ocean City's formulator, Kiyohide Terai, a professor at the University of Electronic Communications in Tokyo, envisions this city containing homes, a business and financial center, a shopping district, and various entertainment facilities. Most importantly, this island will serve as a home for over 1 million people. His city will rest atop 10,000 hefty columns anchored to the bottom of the sea with multimillion-ton concrete blocks.

Although the stuff of science fiction, the conceptualization is architecturally feasible. Many consider this plan superior to that suggested in 1988 by another architect, Kisho Kurokawa, who suggested that the island could be built from the sea floor up, using sand and recycled waste as the base. Kurokawa envisioned this artificial island sitting in the middle of Tokyo Bay.

Access to Ocean City will be provided by plane and hovercraft riding at 115 miles per hour. The cost of constructing an artificial island and providing its inhabitants continual transportation is expensive but not prohibitive. Regardless of its cost, however, most analysts agree that it may be cheaper for the Japanese to build a whole new island than enlarge existing structures in Tokyo.

This idea has quickly spread to other countries, such as Monaco. Although incredibly wealthy, this tiny country suffers from a major land shortage problem. Hemmed in by the foothills of the French Alps and the Mediterranean, this kingdom occupies a total of 480 acres. The principality now intends to expand on its limited real estate.

In its quest, it has developed and patented a revolutionary method of constructing a protective dike without resorting to massive landfills. The sea that confronts Monaco would be controlled by a system of submerged "containers" that would be linked together and supported by pylons. This technique will allow the installation of the dike at depths up to 260 feet.

Then, prefabricated pontoons containing apartments, carparks, and mooring bays will be towed out to sea and assembled. This floating structure, named Fontvieille II, would create living space for nearly 2000 persons.

Regardless of their architecture, these new cities built at sea will have profound sociological effects on global relations. Certainly, such wonders reduce the chances of war. History provides countless examples of small, isolated, land-locked countries that employ such tactics as forced migration, invasion, or war to expand their borders. Structures such as artificial islands and underground cities help such countries to satisfy their population and resource needs by physically expanding their own territory instead of invading and annexing others.

Also, the building of artificial islands pulverizes the orthodox economic contentions that we live in a world of limited or scarce resources. Although economists love to use the example of finite land mass as a proof of such zero-growth concepts as "matter can be neither created nor destroyed," we see that matter, in this case, land mass, can be manipulated in such a way that for all practical purposes matter does grow and expand. By constructing such islands, Japan and Monaco have effectively created more real estate.

A2: Land Scarcity Leads To War

Land scarcity doesn't cause war
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 426-427

But the idea about land and territoriality and population that Hitler held—the idea that has prevailed since the beginning of recorded history—does not apply in a modern world. Additional territory nowadays generally has no value to a nation. And to top it all off, oft-denounced population growth is the underlying cause of this happy situation.
This does not mean that wars have ended. Nations start wars for many reasons. David S. Kleinman argues cogently that if ever a population change might have altered the propensity for war, it should have been the Black Death, by increasing the availability of land—but warring continued unabated.32 Quincy Wright concluded that economic issues have not been the main cause of war, or even the dominant cause.
In sum, studies of both the direct and indirect influence of economic factors on the causation of war indicate that they have been much less important than political ambitions, ideological convictions, technological change, legal claims, irrational psychological complexes, ignorance, and unwillingness to maintain conditions of peace in a changing world.

A2: Not Enough Space For Garbage

The need for more space for waste and garbage is exaggerated – we're doing just fine.
Bjorn **Lomborg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01,** p. 207-208

In Figure 115 this landfill area is illustrated as being placed in Woodward County, Oklahoma. All the American waste of the entire twenty-first century will fit into a single landfill, using just 26 percent of the Woodward County area 1588 Of the state of Oklahoma, the landfill would use up less than half a percent1589 Of the entire US landmass, the landfill would take up about one-12,000th - less than 0.009 percent.1590 Equivalently, one could imagine that each state would handle its own garbage - for argument's sake, let us just say one-fiftieth each. Then, in order to handle all the waste production of the twenty-first century, each state merely needs to find space for a single, square landfill, 2.5 miles on each side.1591
Moreover, the scenario with ever increasing amounts of waste is probably rather exaggerated, especially considering that most economic growth will be in the service industries and information technology, as we noted in the chapter on raw materials. Even in material production the general trend is towards the use of fewer materials - a sort of dematerialization of the economy.'s92 The car is an excel-lent example, representing a full basket of products from an industrialized economy, with metals, plastics, electronic materials, rubber, and glass. Since the early 1970s, carbon steel has been replaced with high-tech steel, plastics and composites, with the new materials substituting the old at a rate of one to three, making the car ever lighter without compromising structural integrity.'s93
Even so, the main point here is that we will not be inundated with garbage. Garbage is something we can deal with. It is a management problem.

A2: Desertification

No threats of desertification – its cyclical
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 132-133

When confronted by the aggregate data, the loss-of-land warriors bring up the supposed "desertification," especially in the Sahara region. This has been hard to disprove until recently. But once again the anecdotal claim is confounded by scientific evidence when it can be gathered:
Despite the widely held impression that the sands of the Sahara are relentlessly expanding, consuming villages and contributing to famine in Africa, a new analysis of satellite images… shows the greatest desert on Earth has stopped growing and is now shrinking. For years, researchers and agencies have assumed the Sahara's advance was implacable, but scientists who examined 4,500 satellite pictures taken over the past decade say it is clear the Sahara essentially reversed its expansion in 1984, and has since contracted dramatically.13
The story goes on to quote Compton J. Tucker and Harold Dregne, as saying that the previous belief in Sahara expansion was "simply assumed," and that expansion and contractions seem to be natural. Trying "to stop the natural process probably would be fruitless."

A2: Soil Erosion

No impact to soil erosion
Jerry **Taylor,** Director of Natural Resource Studies at the CATO Institute, "The Growing Abundance of Natural Resources" in "Market Liberalism: A Paradigm for the 21st Century", 19**93**, http://cato.org/pubs/chapters/marlib21.html

Although conservationists argue that accelerating soil erosion will make those productivity gains short-lived and illusory, the facts speak otherwise. Most of the world's worst soil erosion problems are the result, not of modern high-yield farming, but of attempts to use low-yield, traditional agricultural techniques on fragile soils.30
Studies by the U.S Department of Agriculture, the University of Minnesota's Soil Sciences Department, and economist Pierre Crosson of Resources for the Future all conclude that, at current erosion rates, heavily farmed soils in the United States might lose 3 to 10 percent of their inherent fertility over the next 100 years. Such small losses are sure to be more than offset by continued improvements in agricultural productivity even if no new conservation techniques are adopted. As Crosson noted:
The success of the new [high-yield] technologies strongly suggests that erosion damage to soils in the main crop- producing regions of the country was not and is not as severe as is sometimes claimed. Soil scientists have acknowledged that even severely eroded soil can be restored to high productivity with investments of human skill and other resources, even though they may seem to forget this when they make pronouncements about the erosion threat. Continuation of present rates of erosion throughout most of the next century would pose no serious threat to the productivity of the nation's soils.31

Soil quality is increasing – minimal risk of erosion
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 146-147

It is important to put such isolated claims into context. A tiny proportion of cropland—3 percent—is so erosive that no management practices can help much. Seventy-seven percent of cropland erodes at rates below five tons per acre each year—the equilibrium rate at which new soil is formed below the surface, that is, the "no net loss" rate. Only 15 percent of U.S. cropland "is moderately erosive and eroding about a 5-ton tolerance. Erosion on this land could be reduced with improved management practices," though this does not necessarily mean the land is in danger or is being managed uneconomically. 12
In short, the aggregate data on the condition of farmland and the rate of erosion do not support the concern about soil erosion. What's more, the data suggest that the condition of cropland has been improving rather than worsening. Theodore W. Schultz and Leo V. Mayer both wrote very forcefully that the danger warnings were false. Schultz cited not only research but also his own life-time recollections starting as a farm boy in the Dakotas in the 1930s. Figure 9-4 shows data from soil surveys which make clear that erosion has been lessening rather than worsening since the 1930s. But even a Nobel laureate's efforts (Schultz's) could not slow the public-relations juggernaut that successfully co-opted the news media and won the minds of the American public.

Figures on erosion are not factually based,
Bjorn **Lomborg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 104-105

Another common worry that has featured in the literature is "the degradation and depletion of an environmental resource, for example, the erosion of cropland."711 This fear is based on the fact that when earth erodes owing to the effects of rain and wind, it loses its nutrients and is rendered less capable of retaining water, consequently leading to smaller yields. Lester Brown estimated in 1984 that worldwide we lose 25.4 billion tons of top-soil annually.712 In 1995, Pimentel from Cornell University (whom we met discussing global health in the introduction) estimated the global erosion at 75 billion tons of lost top-soil annually.713
However, there are two serious problems with these figures on erosion. First, they are based on very few and uncertain estimates, primarily stemming from the US. Pimentel found in 1974 that the US lost 30 tons of top-soil per hectare, whereas we now know that the true figure was 12 tons per hectare.74 His estimate of 17 tons per hectare for all of Europe has turned out to stem - via a string of articles, each slightly inaccurately referring to its predecessor - from a single study of a 0.11 hectare plot of sloping Belgian farmland; the author himself warns against generalization from this 715 The 75 billion tons figure comes from an environmental atlas by Myers.716 IFPRI concludes that "the early, high estimates of soil degradation have not been substantiated."717 One of the few studies actually to have looked at long-term measurements in China and Indonesia (making up 15 percent of the globally eroded area) has found very little support for these high estimates.718 Indeed, as regards topsoil, the study shows that "the top-soil layer probably did not grow significantly thinner between the 1930s and the 1980s in either China or Indonesia."719

A2: Soil Erosion

Erosion is irrelevant – there is no correlation to crop yield.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 105

Second and more importantly, Pimentel neglects to discuss the two primary erosion studies, of which one has been sponsored by the UN. The studies seem to indicate that the effect on agricultural production is vastly overstated.
There is no doubt that over the last couple of hundred years we have lost more topsoil than has been created, and that the absolute loss is increasing, primarily because we have had increasing agriculture.720 Nor is there any doubt, that there has been soil erosion ever since the beginning of agriculture and that writers of the classical era were already worrying about the phenomenon.721
But the important point here is of course the effect of erosion on agricultural productivity. Here it turns out that there is no clear connection between erosion and yield. FAO, the Food and Agricultural Organization of the UN, puts it thus: the impact of erosion "on crop yields or production has not been well established in physical terms though there have been many attempts to do so. The relationship between erosion and productivity loss is more complex than previously thought."722 The FAO adds that much of the disappearing soil is simply deposited further down the slope, valley or plain, and that the yield loss in the eroded area could be compensated by yield gains elsewhere. It turns out that only very little eroded topsoil moves very far - the last two hundred years of water erosion in Piedmont, US, has moved only 5 percent of the eroded soil all the way into a river.723 A comprehensive study on China shows that the total consequence of the ups and downs in all the different soil characteristics shows "no net soil degradation."724

A2: Deforestation

US forest area is growing – global deforestation isn't a risk
Jerry **Taylor**, Director of Natural Resource Studies at the CATO Institute, "The Growing Abundance of Natural Resources" in "Market Liberalism: A Paradigm for the 21st Century", 19**93**, http://cato.org/pubs/chapters/marlib21.html

The fear that mankind is rapidly deforesting the globe has arisen on and off ever since the 18th century. Yet precious little evidence, other than anecdotes, has ever been advanced to support that lamentably widespread belief.
According to the most recent UN data, the most authoritive figures at our disposal, world forestland today covers 4 billion hectares, more than 30 percent of the total global land area. That figure has not changed appreciably since 1950, even in the midst of the population explosion, massive economic growth, and urbanization of the globe. Today forestland occupies about one-third of the United States, and that proportion has been expanding steadily for over 70 years. According to the U.S. Forest Service, 22 million new cubic feet of wood are grown annually in the United States, while only 16.5 million cubic feet are harvested. Net annual growth exceeds annual harvests in commercial forests by 27 percent.
Since 1920 U.S. forests have expanded by 57 percent, a remarkable fact given that during the same period the U.S. population doubled, the economy grew by a factor of 6, and per capita output increased by a factor of 3. Forestland has increased by 27 percent since 1952.32 Although demand for wood products today is at an all-time high, the United States is still able not only to meet demand with currently available timber stock but to continue adding to forest reserves. In fact, there is only one-third less forestland in the United States today than there was in the 1600s when European settlers first encountered it.
An example of the striking increase in U.S. forest reserves is found in New England, where logging thrived in the 19th century. From the mid-1800s to 1980 the amount of land covered by forests increased from 74 to 90 percent in Maine; from 50 to 86 percent in New Hampshire; from 35 to 76 percent in Vermont; and from 35 to 59 percent in Connecticut, Massachusetts, and Rhode Island.33
That growth in forest reserves is reflected in the price of various wood commodities. The real prices of lumber and paper have fallen by 10 and 25 percent, respectively, since 1980. When indexed to wages, lumber prices today are one-third those of 1950, one-sixth those of 1900, and one-tenth those of 1800. Likewise, the cost of paper when indexed to wages is less than half that of 1930.34
The increased supply of wood has not come at the expense of rugged, pristine nature preserves. From 1980 to 1989 land classified as wilderness increased by 29 percent. Although environmentalists argue that the second-growth forests of today are ecologically inferior to the old-growth forests that the colonists encountered three centuries ago, Roger Sedjo of Resources for the Future points out:
In the United States, the forest estate consists of a wide array of forest types and ages. In this regard it is not too different from the mosaic of forest types present during the time of early settlement. The species found in these stands are usually similar to those that would have existed there at settlement. Even in most forest plantations in the United States the species composition mimics the forest that would have naturally regenerated there. By most criteria, U.S. forests are in excellent condition. U.S. forests have shown the potential to deliver large volumes of wood on a sustainable level into the indefinite future.35

More evidence, Forest area is rising
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 155

As the Council on Environmental Quality explained, "trends in net annual timber growth [total annual growth less mortality] show that the net annual growth of softwoods and hardwoods combined increased by 18 percent between 1952 and 1962 and another 14 percent between 1962 and 1970. This increase is a result of expanded programs in forest fire control, tree planting, and other forestry measures."i3 Since then, the amount of lumber being grown has continued to rise (see fig. 10-3).
Data on the trends in quantities of trees growing in various size classes of hardwoods and softwoods show the basis for both the fears of the environmentalists and the reassurances of the forest industry. The largest and oldest trees—the Douglas firs and other softwoods of the Pacific Northwest—were cut at an extraordinary rate from the 1960s to the 1980s. (The rate of cutting may have been increased by fear of coming regulations, one of the side effects of regulation.) But the quantity of trees in just about every other category has been increasing rapidly. and the rate of removal of the old growth in the Pacific Northwest has slowed almost to a crawl.
Data on reforestation are shown in figure 10-4. And 86 percent of that reforestation is private, only 14 percent being done by government—testimony again to the role of private incentives in creating both wealth and ambiance. Many trees are planted in order to be cut down—especially for paper. Indeed, "87 percent of all paper in the United States is produced from trees planted and grown for that purpose by the paper industry."14 Hence, regretting the cutting of trees for paper is like lamenting the cutting of corn in cornfields.

A2: Deforestation

European forest area is growing
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 158-159

The situation in Europe is much the same. Forest resource surveys, which provide fairly reliable data, show that for Austria, Finland, France, Germany, Sweden, and Switzerland, there has been "a general increase of forest re-sources" in recent decades" (see fig. 10-6). Estimates for other European countries based on less accurate methods indicate that "all countries reported an increase of growing stock between 1950 and 1980."17
These data are at odds with assertions that European trees have been adversely affected by air pollution. The forestry specialists reporting in Science therefore adjudge that "the fertilization effects of pollutants override the ad-verse effects at least for the time being." In fact, the rate of growth of tree size in Europe has been faster in more recent years than earlier in the century. Of course there have been some cases of forest decline due to pollution, such as the five kilometers around a smelter at Kola in northwestern Russia. The dam-aged areas total perhaps two thousand square kilometers in the former Soviet Union, and a total maximum of eight thousand square kilometers in Europe, less than 0.5 percent of the total.18

No deforestation
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 159

Even taking the world as a whole—which includes poor countries that are still in the phase of deforesting (they will reforest when they become more affluent)—the total quantity of forests shows no evidence of declining, as seen in figure 10-7.

Forests have remained stable in the past century – and growing
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 111-112

Globally, forest cover has remained remark-ably stable over the second half of the twentieth century. With the longest data series, global forest cover increased from 30.04 per-cent of the global land area in 1950 to 30.89 percent in 1994, or an increase of 0.85 percentage points over 44 years.768 With the some-what shorter data series from 1961, global forest cover is estimated to have fallen from 32.66 percent to 32.22 percent. That is to say, it has fallen by 0.44 percentage points over the last 35 years or so. The UN carried out two global forest surveys in 1995 and 1997 and evaluated a more limited definition of forest area for the period 1980-90 and 1990-5. The survey found that the area covered by forest had shrunk from 27.15 percent to 25.8 per-cent, or by 1.35 percentage points, although these figures are vitiated by considerable uncertainty. For example, an upwards revision of the 1990 forest area was larger than the entire global decline in 1990-5 (or to put it differently - had the 1990 forest area not been revised, the period 1990-5 would have seen an increase in forested area) 769 Moreover, Russia, which has the world's largest forest cover, was not included in the survey. Thus, with these considerable short-term uncertainties it seems necessary to focus on the longest possible time periods. Those interested are referred to a longer discussion in the footnotes.'" In the newest forest study from 2001, the FAO has changed the definitions of forest once again and made a new estimate of forested area from 1990-2000, showing a small decline from 29.5 to 28.8 percent.'"
Most forest by far is concentrated in a few countries. Russia, Brazil, the US and Canada together have more than 50 percent of the world's forest.72 Globally there is about two to three times as much forests as cropland.'" 111-112

A2: Deforestation

Deforestation is overstated – rates are consistently falling.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 114-115

However, in order to evaluate the entire extent of this problem, it is necessary to look at how much tropical forest has actually disappeared. Although precise figures are not avail-able, the Conservation Union World, the IUCN, estimates that 80 percent of the original forest cover is still in place. Within historical times, then, just about 20 percent of all tropical forests has disappeared.812 Compared with the developed world, where we have cleared almost half of our forest, this is a relatively small figure.
Countries such as Nigeria and Madagascar have admittedly lost well over half their original rainforest, and Central America may have lost 50-70 percent 813 But overall, they are only home to about 5 percent of the world's tropical forest. Most of it by far is in the Brazilian Amazon814 The Brazilian forests make up a third of the world's tropical forest. In comparison, Indonesia - the second largest tropical forest area - "only" has 6 percent of the global total.
In 1988, scientists at Brazil's space agency (INPE) announced that its satellites had located as many as 7,000 fires, and that Brazil was now cutting down 8 million hectares of its forests - some 2 percent - a year.815 These figures attracted extensive criticism of Brazil for its destruction of irreplaceable nature. It later transpired, however, that these figures had been grossly overstated, and the official preliminary estimate for 1999 was about 1.7 million hectares a year, or just below 0.5 percent a year. In actual fact, overall Amazonian deforestation has only been about 14 percent since man arrived, as can be seen in Figure 61.816 At least some 3 percent of this 14 percent has since been replaced by new forest817
Obviously, Figure 61 doesn't look that bad. There is in fact reason to believe that 70 per-cent of the Amazon forest will remain intact, and in April 1998 the Brazilian government promised that protection orders would be slapped on a further 25 million hectares.818 The WWF, however, told us in 1996 that deforestation had increased by 34 percent since 1992. They did not tell us a year later that the 1997 rate had fallen by over 50 per-cent, the second lowest amount since monitoring began. 114-115

Current forest growth makes up for our demand of tree-products – it checks deforestation.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 115

At the same time, numerous false impressions exist regarding the condition of our forests. Most people believe that over the last 50 years we have wiped out large swathes of rainforest, and perhaps temperate forest as well. Statements such as the one from the WWF quoted above naturally help to cement this idea. But as we have pointed out, there has not been a fall in global forest area during this period. On the other hand, Europe got rid of a large proportion of its forest by the end of the Middle Ages in order to make room for farming and bigger populations.
Many people also worry that our paper consumption and the use of printed advertising is laying the forests to waste. The Worldwatch Institute wrote in 1998 that "the dramatically increasing demand for paper and other wood products . . . [is] turning local forest destruction into a global catastrophe."822 But in actual fact, our entire consumption of wood and paper can be catered for by the tree growth of just 5 percent of the current forest area s23 115

Despite problems, our forests are not threatened.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 117

Basically, however, our forests are not under threat. In a historical perspective, about 20 percent of all forest has been lost, while about a third of the world's land mass is still covered by forest, and since World War II this area has not changed much. Tropical forests are being deforested, though on levels much below the feared 1.5-4.6 percent per year - the newest data from the FAO indicate an annual rate of 0.46 percent. In developing countries, forests are sometimes managed in a thoughtless and irresponsible fashion, but the primary solution to this will be higher growth and a better economic foundation so as to secure the countries concerned the resources to think long-term. On moral grounds, we can aspire to reduce tropical deforestation with the aim of limiting the reduction in biodiversity, although we must also realize that biodiversity is being reduced to a much lesser extent than originally thought.
Finally, the world's demand for paper can be permanently satisfied by the wood production of just 5 percent of the current forest cover. Plantations do not account for much of the overall forest area, and they actually help relieve pressure on natural forest, which still-dominate more than 95 percent of the world's forests. 117

A2: Species/Biodiversity Loss

Impacts to species loss are exaggerated
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 440

Yet the data on the observed rates of species extinction are wildly at variance with common belief, and do not provide support for the various policies suggested to deal with the purported dangers. Furthermore, recent scientific and technical advances—especially seed banks and genetic engineering, and perhaps electronic mass-testing of new drugs—have rendered much less crucial the maintenance of a particular species of plant life in its natural habitat than would have been the case in earlier years.

Negative arguments overstate the risk – species loss is low
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 445

Starting in the early 1980s, I published the above critical analysis of the standard extinction estimates. For several years these criticisms produced no response at all. But then in response to questions that I and others raised, the "official" IUCN (the World Conservation Union) commissioned a book edited by Whitmore and Sayer to inquire into the extent of extinctions.15 The results of that project must be considered amazing.
All the authors—the very conservation biologists who have been most alarmed by the threat of species die-offs—continue to be concerned about the rate of extinction. Nevertheless, they confirm the central assertion; all agree that the rate of known extinctions has been and continues to be very low. I will tax your patience with lengthy quotations (with emphasis supplied) documenting the consensus that there is no evidence of massive or increasing rates of species extinction, because this testimony from the conservation biologists themselves is especially convincing; furthermore, if only shorter quotes were presented, the skeptical reader might worry that the quotes were taken out of context. (Even so, the skeptic may want to check the original texts to see that the quotations fairly represent the gist of the the authors' arguments.)

The loss of biodiversity and species extinction are overstated.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 257

Taking the biologists' warnings about the extinction of species has consequences for our priorities. We accepted the biodiversity convention signed in Rio in 1992, partly because the "species extinction caused by human activities continues at an alarming rate."2087 It obliges us to introduce the conservation of species into the national political process 2088
We demand that the developing countries stop chopping down their rainforest even though we have eradicated about 99 percent of our own primary forest.
A 1993 article in Science on the cost of biodiversity reported that "scientific luminaries such as Edward O. Wilson of Harvard and Paul Ehrlich of Stanford" were endorsing the principles behind the Wildlands Project, a hugely ambitious plan to protect biodiversity in North America, which called for "a network of wilderness reserves, human buffer zones, and wildlife corridors stretching across huge tracts of land" amounting to as much as half of the continent. In the words of the Science article the long-term goal of the project amounted to "no less than a transformation of America from a place where 4.7% of the land is wilderness to an archipelago of human-inhabited islands surrounded by natural areas." Inevitably, the implementation of such a scheme would involve mass movements of people.2089
Why sign the biodiversity convention? Why save the rainforest? Why require millions of Americans to move to city islands with severely restricted access to neighbouring countryside? The answer has always been: in order to save 40,000 species from becoming extinct every year.2o9°
It is a "common knowledge" argument that has entered our political vocabulary. The Brundtland report states that "over the longer term, at least one-quarter, possibly one-third, and conceivably a still larger share of species existing today could be lost."209' The well-publicized internet site Web of Life tells us that 50,000 species die every year.2o92 Worldwatch Institute warns us of economic development: we may grow richer, but we should consider if we really have gained if we "also wipe out half of the world's plant and animal species."2°93
The dramatic loss of biodiversity, expressed in the 40,000 species a year, is a dramatic figure, created by models. It is a figure which with monotonous regularity has been repeated everywhere until in the end we all believed it. It has become part of our environmental Litany. But it is also a figure which conflicts with both observation and careful modeling.

Of course, losing 25-100 percent of all species would be a catastrophe by any standards. However, losing 0.7 percent per 50 years over a limited time span is not a catastrophe but a problem - one of many that mankind still needs to solve. Facing these facts is important when we have to make tough choices where to do the most good with our limited resources. 73

Indicts: Environmental Disaster/Doomsay Scenarios Biased

Environmental statistics are mishandled in the mainstream – their radical claims are suspect
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01**, p. 28-29

Other rhetorical figures are often employed. In one of the background documents for the UN assessment on water, the authors see two "particularly discomforting" alternatives for the arid, poor countries: "Either by suffering when the needs for water and water-dependent food cannot be met, manifested as famines, diseases and catastrophes. Or, in the opposite case, by adapting the demand to the available resources by importing food in exchange for other, less water-dependent products."223 Now that sounds like a choice between the plague and cholera, until you think about it - they are essentially asking whether an arid country should choose starvation or partake in the global economy.
Worldwatch Institute wants us to change to renewable energy sources, as we have already described. Some of these arguments are entirely powered by rhetoric, as when they tell us: "From a millennial perspective, today's hydrocarbon-based civilization is but a brief interlude in human history."224 This is obviously true. A thousand years ago we did not use oil, and a thousand years from now we will probably be using solar, fusion or other technologies we have not yet thought of. The problem is that this does not really narrow down the time when we have to change energy supply - now, in 50 years or in 200 years? When seen from a millennial perspective, many things become brief interludes, such as the Hundred Years War, the Renaissance, the twentieth century and indeed our own lives.
Likewise, when we argue about the consequences of ecosystem changes it is easy to think of and mention only all the negative consequences. This is perhaps most evident when we discuss global warming and global climate change. Take for instance this description of climate change from Newsweek:
There are ominous signs that the Earth's weather patterns have begun to change dramatically and that these changes may portend a drastic decline in food production - with serious political implications for just about every nation on Earth. The drop in food output could begin quite soon, perhaps only 10 years from now.
The evidence in support of these predictions has now begun to accumulate so massively that meteorologists are hard-pressed to keep up with it. In England, farmers have seen their growing season decline by about two weeks since 1950, with a resultant overall loss in grain production estimated at up to 100,000 tons annually. During the same time, the average temperature around the equator has risen by a fraction of a degree - a fraction that in some areas can mean drought and desolation. Last April, in the most devastating out-break of tornadoes ever recorded, 148 twisters killed more than 300 people and caused half a billion dollars' worth of damage in 13 U.S. states.
To scientists, these seemingly disparate incidents represent the advance signs of fundamental changes in the world's weather. Meteorologists disagree about the cause and extent of the trend, as well as over its specific impact on local weather conditions. But they are almost unanimous in the view that the trend will reduce agricultural productivity.22s
While this sounds surprisingly familiar with the greenhouse worries we hear today, it is actually a story from 1975 entitled "The Cooling World" - from a time when we all worried about global cooling. Of course, today there are better arguments and more credible models underpinning our worry about global warming (which we will discuss in Part V), and since our societies are adjusted to the present temperature, either cooling or warming will entail large costs.
But notice how the description conspicuously leaves out any positive consequences of cooling. Today, we worry that global warming will increase the outreach of malaria - consequently, a world believing in cooling should have appreciated the reduction of infected areas. Equally, if we worried about a shortening of growing seasons with a cooling world, we should be glad that global warming will lengthen the growing season.226 Obviously, more heat in the US or the UK will cause more heat deaths, but it is seldom pointed out that this will be greatly outweighed by fewer cold deaths, which in the US are about twice as frequent.227 Notice, this argument does not challenge that total costs, certainly worldwide, will outweigh total benefits from global warming, but if we are to make an informed decision we need to include both costs and benefits. If we rhetorically focus only on the costs, it will lead to inefficient and biased decisions.

Indicts: Environmental Disaster/Doomsay Scenarios Biased

The environmental movement misuses rhetorical figures to prove points that are false in the real world.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001**, p. 27

One of the main rhetorical figures of the environmental movement is to pass off a temporary truism as an important indicator of decline. Try to see what your immediate experience is of the following quote from the Worldwatch Institute: "As a fixed area of arable land is divided among ever more people, it eventually shrinks to the point where people can no longer feed themselves."215 This statements sounds like a correct prediction of problems to come. And yes, it is evidently true - there is a level (certainly a square inch or a speck of soil) below which we could not survive. However, the important piece of information is entirely lacking because we are not told what this level is, how close we are to it, and when we expect to cross it 216 Most people would probably be surprised to know that, with artificial light, each person can survive on a plot of 36 m2 (a 6 m square), and that companies produce commercially viable hydroponic food with even less space.21' Moreover, FAO finds in its newest analysis for food production to 2030 that "land for food production is seen to have become less scarce, not scarcer."218 Thus, the argument as stated is merely a rhetorical trick to make us think, "oh yes, things must be getting worse."
This rhetorical figure has been used a lot by Worldwatch Institute. Talking about increasing grain yields (which we will discuss in Part III), Lester Brown tells us that "there will eventually come a point in each country, with each grain, when the farmers will not be able to sustain the rise in yields."219 Again, this is obviously true, but the question is how far away is the limit? This question remains unanswered, while Brown goes on to conclude the some-what unimaginative rerun of the metaphor: "Eventually the rise in grain yields will level off everywhere, but exactly when this will occur in each country is difficult to anticipate."220 Likewise, Lester Brown tells us that "if environmental degradation proceeds far enough, it will translate into economic instability in the form of rising food prices, which in turn will lead to political instability."221 Again, the sequence is probably correct, but it hinges on the untold if - is environmental degradation taking place and has it actually proceeded that far? That information is never demonstrated.

Environmental doomsday literature mishandles scientific fact; the media turns it into propaganda.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001**, p. 12-13

It is crucial to the discussion about the state of the world that we consider the fundamentals. This requires us to refer to long-term and global trends, considering their importance especially with regard to human welfare.
But it is also crucial that we cite figures and trends which are true.
This demand may seem glaringly obvious, but the public environment debate has unfortunately been characterized by an unpleasant tendency towards rather rash treatment of the truth. This is an expression of the fact that the Litany has pervaded the debate so deeply and for so long that blatantly false claims can be made again and again, without any references, and yet still be believed.
Take notice, this is not due to primary research in the environmental field; this generally appears to be professionally competent and well balanced.70 It is due, however, to the communication of environmental knowledge, which taps deeply into our doomsday beliefs. Such propaganda is presented by many environmental organizations, such as the Worldwatch Institute, Greenpeace and the World Wide Fund for Nature, and by many individual commentators, and it is readily picked up by the media.
The number of examples are so overwhelming that they could fill a book of their own. I will consider many of them in the course of this book, and we will look specifically at their connection to the media in the next chapter. However, let us here look at some of the more outstanding examples of environmental mythmaking.

Indicts: Environmental Disaster/Doomsay Scenarios Biased

Environmentalists have an incentive to exaggerate harms in order to secure spending.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 38-39

Thus as the industry and farming organizations have an obvious interest in portraying the environment as just-fine and no-need-todo-anything, the environmental organizations also have a clear interest in telling us that the environment is in a bad state, and that we need to act now. And the worse they can make this state appear, the easier it is for them to convince us we need to spend more money on the environment rather than on hospitals, kindergartens, etc. Of course, if we were equally skeptical of both sorts of organization there would be less of a problem. But since we tend to treat environmental organizations with much less skepticism, this might cause a grave bias in our understanding of the state of the world.

Negative effects are overplayed – environmental concerns empirically can do more good than harm.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 40-41

Finally, it is the media that pass on the results of research, possibly helped along by the organizations. The media play a central role in this connection because the world has become so complex that we can no longer rely primarily on our own experiences. Instead, the mass media provide much of our understanding of reality.
But their particular way of providing us with news profoundly influences our view of the world. There is of course rarely much doubt that facts reported in an article or a news report are generally true. In that sense, the media simply reflect the world as it is. What is interesting, however, is the long and winding path between an event taking place in the world and its possible appearance and placement in the media. Looking at news reporting in this way shows how the media systematically present us with a lopsided version of reality: a picture of reality which is incoherent and sporadic, though at the same time reassuringly predictable and familiar: A picture where problems fill every column, and the emphasis is on drama and conflict. As an editor-in-chief has put it: "Producing a paper is a question of distorting proportions."275
This media-based reality has numerous con-sequences. First, the incoherent information we are given provides us with too little knowledge of concrete problems to enable us to take part in a democratic decision-making process. Second, we feel sufficiently comfortable that we believe we actually do have sufficient knowledge to partake in the debate and to make valid decisions. Third, we will often get a far too negative and distorted impression of the problems.

The media is biased – they focus only on negative aspects of the environment and highlight individual rather than policy action.
Bjorn **Lomborg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. 20**01,** p. 41

In the hunt for good news, conflict is also brought into focus. A conflict has that grip-ping dramatic element familiar from fairy tales and other literature, a battle between good and evil which the audience must follow to the bitter end to find out what happens. Journalists are actually taught how to tailor their stories to patterns from fairy tales.297
Closely related to the story of conflict is the question of guilt.298 It is not uncommon for one of the involved parties to be given the blame for the conflict, which helps to give the news a more human touch. We have seen examples of this in the US, where efforts to do something about garbage dumps is given far higher priority compared to combating radio-active radon, even though combating radon would be far more effective. Why? Because a garbage dump provides "good pictures" and because garbage dumps are "somebody's fault."299
It is generally important to journalists that their stories are "close" to the reader. This is often a question of involving people in a story and being able to explain what is going on in simple terms.
Finally, a story has to be new and exciting. A story about a new problem or new conflict is potentially far more interesting than describing an already familiar, traditional problem.
The consequences
One consequence of the demand for rapid news delivery is that our view of the world becomes fragmented. Our demand for interesting and sensational news means that our picture of the world becomes distorted and negative. Coupled with the finely tuned PR units of the environmental organizations and problem-oriented research, this can provide serious bias towards a negative appraisal of the state of the world.

Prefer Statistics To Rhetoric

Relying on rhetoric instead of sound analysis leads to false predictions.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001**, p. 29.

Again, the problem with this rhetorical figure is that it only indicates that crashing is indeed possible, but it makes no effort to explain why such crashing should be likely. It is worth realizing that of the 10,000 Pacific islands, only 12, including Easter Island, seem to have undergone declines or crashes, whereas most societies in the Pacific have indeed been prosperous 232 Moreover, a model of Easter Island seems to indicate that its unique trajectory was due to a dependence on a particularly slow-growing palm tree, the Chilean Wine palm, which takes 40 to 60 years to mature233 This sets Easter Island apart from all the other Polynesian islands, where fast-growing coconut and Fiji fan palms make declines unlikely.
Moreover, the models predicting an ecological collapse need increasing populations with increasing demands on resources to produce an overshoot. But in the modern world, such a scenario seems very unlikely, precisely because increased wealth has caused a fertility decline (we will discuss this so-called demographic transition in Part II)234 And finally, it is worth pointing out that today's world is much less vulnerable, precisely because trade and trans-port effectively act to reduce local risks.
The consequences of relying on rhetoric instead of sound analysis are many, primarily poor forecasts and consequent biased decisions. Perhaps the most famous set of predictions came from the 1972 global best-seller Limits to Growth, that claimed we would run out of most resources. Indeed, gold was predicted to run out in 1981, silver and mercury in 1985, and zinc in 1990,235 though as we shall see in Part III, most resources actually have become more abundant. Needless to say, gold, silver, mercury and zinc are still here too.

Rhetoric and simplistic models create false, sensationalist predictions: prefer our evidence because it is based on the best indicators and models.
Bjorn **Lombarg,** associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 30

This view was fleshed out in the book The End of Affluence from 1974, written by Ehrlich with his wife Anne240 Here they worried about how global cooling would diminish agricultural output24' (which has since increased 53 percent; see Figure 51, p. 95) and forecast trouble with the fisheries, because the global catch had reached its maximum242 (since then the global catch has increased by 55 percent, as you can see in Figure 57, p. 107). They saw a society which was driven by deluded economists "entrapped in their own unnatural love for a growing gross national product."243 The ultimate consequence was clear: "It seems certain that energy shortages will be with us for the rest of the century, and that before 1985 mankind will enter a genuine age of scarcity in which many things besides energy will be in short supply . . . Such diverse commodities as food, fresh water, copper, and paper will become increasingly difficult to obtain and thus much more expensive . . . Starvation among people will be accompanied by starvation of industries for the materials they require."29
Though rhetorically eloquent, time has not been kind to these predictions. Thus, when we evaluate the data on the state of the world, it is important not to be swayed merely by rhetoric or simplistic models, but to use and pre-sent the best indicators and the best models.

Malthus Frontline

ZERO GROWTH KILLS THE US ECONOMY
Joseph L. **Bast**, President and CEO of the Heartland Institute, Heartland Perspectives, "Ending the Myth of Overpopulation", July 8, 19**99**, http://www.heartland.org/Article.cfm?artId=629

A world with zero population growth would be especially bad for the most prosperous countries, such as the U.S., which have already achieved zero population growth. Those countries rely on immigration to keep up with the rising need for workers, and their economies increasingly rely on exporting goods and services to faster-growing developing nations. Slower population growth means fewer jobs and lower pay in the U.S.

Economic collapse causes nuclear war and extinction
Beraden in '00
(Lt. Col. Tom, PhD in Nuclear Engineering, "Zero-Point Energy", April 25, http://www.cheniere.org/correspondence/042500%20-%20modified.htm)

Just prior to the terrible collapse of the World economy, with the crumbling well underway and rising, it is inevitable that some of the weapons of mass destruction will be used by one or more nations on others. An interesting result then—as all the old strategic studies used to show—is that everyone will fire everything as fast as possible against their perceived enemies. The reason is simple: When the mass destruction weapons are unleashed at all, the only chance a nation has to survive is to desperately try to destroy its perceived enemies before they destroy it. So there will erupt a spasmodic unleashing of the long range missiles, nuclear arsenals, and biological warfare arsenals of the nations as they feel the economic collapse, poverty, death, misery, etc. a bit earlier. The ensuing holocaust is certain to immediately draw in the major nations also, and literally a hell on earth will result. In short, we will get the great Armageddon we have been fearing since the advent of the nuclear genie. Right now, my personal estimate is that we have about a 99% chance of that scenario or some modified version of it, resulting.

Population will peak – too few people in the status-quo
Mosher 1999
Steven W. Mosher, President of the Population Research Institute, Human Events, "UN used 'Baby Six Billion' in anti-baby crusade", Volume 55, Issue 39, October 22 1999, Proquest

The odd thing about the UNFPA's doom and gloom over the birth of Baby Six Billion is that it is contradicted by the demographic projections of another UN office, the UN Population Division (UNPD), which reports that fertility rates are everywhere falling, and that women around the world are now averaging less than three children, only slightly above the replacement level. The UNPD's "low variant" projection (which historically has proven to be the most accurate) indicates that future world populations will peak between 7 and 8 billion at about 2040 before beginning to decline. The aging of the world's population is another grave concern. Humanity's long-term problem is not too many people, but too few people.

Population growth key to space
Zey in 2000
(Michael - Ph.D in sociology, executive director of the Expansionary Institute – "The Future Factor," p. 86)

<To give an idea of how expansive the Humaniverse might be, let us look at some of Savage's population projections over the next thousand years. Curiously, Savage is one of the few futurists to actually attempt to project the size of the transgalactic population a thousand years hence. Using some basic mathematical extrapolation of an historic growth rate of 2 percent per annum, Savage predicts that 1500 years from now 100,000 billion people will populate the solar system alone. His world has relatively small ecospheres—asteroids, planets, and artificial islands in the middle of space—featuring populations of various sizes but averaging only 100,000 people. (Message: We realistically cannot expect to colonize the solar system, or even a planet the size of Mars, unless we dramatically increase our population numbers beyond the woefully inadequate 6 billion people living on planet Earth.)
These billions, even trillions, of humans living in the solar system will reside on terraformed planets, asteroids encased in membranes, artificial biospheres circling planets and the sun. Seen from afar, the solar system will look brighter, more interesting, fuller, than the mostly darkened void that greets our telescopic gaze today. It will be a rich world, a manifestation of the best qualities of the human species. Most importantly, it will be permeated with humanity.>

Malthus Frontline

Space solves multiple existential threats – the program is key to survival

Pelton in '03 (Joseph, Director of the Space and Advanced Communications Research institute at George Washington University and Executive Director of the Arthur C. Clarke Foundation, "COMMENTARY: Why Space? The Top 10 Reasons", September 23, http://www.space.com/news/commentary_top10_030912.html)

Actually the lack of a space program could get us all killed. I dont mean you or me or my wife or children. I mean that Homo sapiens as a species are actually endangered. Surprising to some, a well conceived space program may well be our only hope for long-term survival. The right or wrong decisions about space research and exploration may be key to the futures of our grandchildren or great-grandchildren or those that follow.

Arthur C. Clarke, the author and screenplay writer for 2001: A Space Odyssey, put the issue rather starkly some years back when he said: The dinosaurs are not around today because they did not have a space program. He was, of course, referring to the fact that we now know a quite largish meteor crashed into the earth, released poisonous Iridium chemicals into our atmosphere and created a killer cloud above the Earth that blocked out the sun for a prolonged period of time.

This could have been foreseen and averted with a sufficiently advanced space program. But this is only one example of how space programs, such as NASAs Spaceguard program, help protect our fragile planet. Without a space program we would not know about the large ozone hole in our atmosphere, the hazards of solar radiation, the path of killer hurricanes or many other environmental dangers. But this is only a fraction of the ways that space programs are crucial to our future.

He Continues…

Protection against catastrophic planetary accidents: It is easy to assume that an erratic meteor or comet will not bring destruction to the Earth because the probabilities are low. The truth is we are bombarded from space daily. The dangers are greatest not from a cataclysmic collision, but from not knowing enough about solar storms, cosmic radiation and the ozone layer. An enhanced Spaceguard Program is actually a prudent course that could save our species in time.

Malthus Frontline

ZPG strategies will fail – they result in despotism and are unsustainable – only space provides resources without limit and solves scarcity
Engdahl, award-winning science fiction writer, 19**94** (Sylvia, "Space and Human Survival, Part I," http://www.sylviaengdahl.com/space/survival.htm)

The question of resources raises an even more crucial reason for expansion into space than the danger of Earth's destruction. It's obvious that this planet cannot support an expanding population forever. Most people who recognize this fact advocate population control to the extent of "zero population growth." I do not; I believe it would be fatal not only for the reason explained above, but because if it could be achieved it would result in stagnation. I do not want a world in which there can be no growth; growth leads to intellectual and artistic progress as well as to material survival. Furthermore, I do not believe it could be achieved. The built-in desire for personal descendants is too strong; that is why our species has survived this long, why it has spread throughout the entire world. Moreover, the biological response to threatened survival is to speed up reproduction, as we can see by the number of starving children in the world. If we tried to suppress population growth completely, we would have either immediate violent upheaval or a period of dictatorship followed by bloody revolution. Ultimately, we would reduce the population all right; we would decimate it. That may be "survival" but it's surely not the future we want. We do not want even the present restriction on resources. Currently, some nations live well while others are deprived, and it's asserted that even those with the best access to resources should stop using them up—the underdeveloped nations, under this philosophy, are not given the hope of a standard of living commensurate with the level our species has achieved. Will the Third World tolerate such a situation forever? I surely wouldn't blame them for not wanting to. And neither do I want the rest of the world reduced to a lower level of technology. Even if I had no other objection to such a trend, the plain fact is that a low level of technology cannot support the same size population as a high level; so if you want to cut back on technology, you have to either kill people outright or let them starve. And you certainly can't do anything toward extending the length of the human lifespan. This is the inevitable result of planning based on a single-planet environment.
If there is pessimism in Earthbound science fiction (which its most outstanding characteristic), these truths are the source of it. I have not seen any that denies any of them; pop-culture SF reveals that what people grasp mythopoeically about such a future involves catastrophic war, cut-throat human relationships in overcrowded cities, and a general trend toward dehumanization. Apart from the major films with which my course dealt (e.g. Bladerunner), Soylent Green postulates cannibalism and Logan's Run is based on the premise that everybody is required to die at the age of 30. The destruction of the world's ecology is a basic assumption—which is natural, since in a contest between a stable biosphere and personal survival, humans will either prevail or they will die.
Myths showing these things are indeed part of the response to a new perception of our environment: the perception that as far as Earth is concerned, it is limited. [A basic premise of my course was that all myth is a response of a culture to the environment in which it perceives itself to exist.] But at the rational level, people do not want to face them. They tell themselves that if we do our best to conserve resources and give up a lot of the modern conveniences that enable us to spend time expanding our minds, we can avoid such a fate—as indeed we can, for a while. But not forever. And most significantly, not for long enough to establish space settlements, if we don't start soon enough. Space humanization is not something that can be achieved overnight.

MALTHUSIAN ETHICS IS IMMORAL – ITS RACIST
Gabriele **Liebig**, Editor of the German Weekly Neue Solidarität and Executive Committee member of the International Caucus of Labor Committees in Europe, The American Almanac, "Eugenics and Population Control: The 1935 Nazi World Population Conference, and the 1994 U.N. Cairo Population Conference -- More of the Same", 19**94**, http://members.tripod.com/~american_almanac/eugenics.htm

It is no exaggeration to compare the United Nations' upcoming international conference on population in Cairo with the 1932 International Eugenics Conference in New York and its continuation at the 1935 International Congress for Population Science, as the following report will prove. Only massive suppression of published facts can explain why the present German government on the one hand pleads ``historical reasons'' not to intervene against Serbian genocide (referring to the Nazis' World War II occupation of Yugoslavia), yet maintains no such scruples with regard to the U.N.-decreed ``battle against overpopulation,'' i.e., the battle to reduce the numbers of non-white people in other parts of the world. It becomes apparent that Nazi propaganda's concept of ``race'' is replaced in today's Malthusian propaganda, ranging from government memoranda to school textbooks, by the equally omnipresent concept of ``the environment'' or its corollary, ``sustainable development.''

Racism will cause extinction – rejection key
BARNDT 91 Co-Director of Crossroads – a ministry to dismantle racism
[Joseph, "Dismantling Racism: The continuing challenge to white America," p.155-156]

To study racism is to study walls. We have looked at barriers and fences, restraints and limitations, ghettos and prisons. The prison of racism confines us all, people of color and white people alike. It shackles the victimizer as well as the victim. The walls forcibly keep people of color and white people separate from each other; in our separate prisons we are all prevented from achieving the human potential God intends for us. The limitations imposed on people of color by poverty, subservience, and powerlessness are cruel, inhuman, and unjust; the effects of uncontrolled power, privilege, and greed, which are the marks of our white prison, will inevitably destroy us as well. But we have also seen that the walls of racism can be dismantled. We are not condemned to an inexorable fate, but are offered the vision and the possibility of freedom. Brick by brick, stone by stone, the prison of individual, institutional, and cultural racism can be destroyed. You and I are urgently called to join the efforts of those who know it is time to tear down, once and for all, the walls of racism. The danger point of self-destruction seems to be drawing even more near. The results of centuries of national and worldwide conquest and colonialism, of military buildups and violent aggression, of overconsumption and environmental destruction may be reaching a point of no return. A small and predominantly white minority of the global population derives its power and privilege from the sufferings of vast majority of peoples of all color. For the sake of the world and ourselves, we dare not allow it to continue.

didn't think we had cards on that did you?

Malthus Frontline

INCREASING POPULATIONS LEAD TO SEA COLONIES – SOLVES OVERPOPULATION
COUTTS, LOGISITCS WORKER FOR MINISTRY OF DEFENSE UK, 20**05** [DAVID, MARSHALL T. SAVAGE AN EXPONENTIALIST VIEW, http://members.optusnet.com.au/exponentialist/Savage.htm]

Savage introduces the problem of the human overpopulation of Earth during the first of his "eight easy steps" in colonising the galaxy. This step is called Aquarius, and involves the building of sea-cities in international waters in a bid to colonise the oceans.
In a section entitled "Malthusian Blues", Savage explains:
"Our future lies in space, but the Earth is the womb of life, and it will be a long time before we can cut our umbilical cord. The new worlds we wish to create can survive only if the Mother of Life (Gaia) is here to nourish them. If we are to fulfil our Cosmic destiny as the harbingers of Life, we must insure the survival of the planet....Our rapacious demands are overtaxing the ability of Gaia to regenerate herself. The result is a dying planet.
We must find a way to avert this catastrophe."
In a clear reference to Paul Ehrlich's "The Population Bomb" (see Ehrlich - An Exponentialist View for more), Savage states:
"The global ocean can provide enough energy and nutrients for us to survive detonation of the population bomb."
Savage believes that these sea colonies will solve our world food crisis and double our energy supply all without adding to our environmental problems. The argument is that the oceans can be more efficiently farmed (with a focus on blue-green algae), and Ocean Thermal Energy Converters will provide the required energy.

MALTHUS' IDEA OF EXPONENTIAL POPULATION GROWTH WAS FLAWED; EXPONENTIAL GROWTH IS NOT NECESSARILY FASTER THAN LINEAR GROWTH
DEMING 2004
[DAVID, University of Oklahoma 's School of Geology and Geophysics, MALTHUS RECONSIDERED, MARCH 22, http://www.ncpa.org/pub/ba/ba469/]

Following Malthus, contemporary scholars often mistakenly assume that exponential growth necessarily implies fast growth. For instance, in the 1972 book Limits to Growth , by Dennis Meadows and others, the authors stated that "Exponential increase is deceptive because it generates immense numbers very quickly." That statement is not necessarily true. Exponential growth need not be faster than linear growth (a straight line), nor is it true that exponential growth must eventually exceed linear growth. Both exponential and linear growth can be fast or slow. Exponential growth of any arbitrary value only exceeds arithmetic growth in one uninteresting case: infinite time. Thus, Malthus' thesis is not necessarily true.

RESOURCE SHORTAGES ARE POLITICAL PRBLEMS, NOT ECOLOGICAL ONES; PEOPLE ALLOW MORE RESOURCES TO BE PRODUCED
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE**, 1995**
[SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20, http://cato.org/testimony/ct-ps720.html]

2. The growth in human population has been more than met by increases in the production of food and other resources, including energy. Famine in the 20th century is a political rather than an ecological phenomenon. We are not running out of resources, and real prices of raw materials are lower than ever before. Only the price of labor consistently rises. Population growth and economic growth are compatible: Between 1776 and 1975, while the world's population increased sixfold, real gross world product rose about 80-fold. People are net resource producers.
3. Countries are not poor because their populations are growing. The England, United States, Hong Kong, and others became rich during unprecedented growth in population. The most densely populated nations are among the richest. What the poor nations suffer from is not too much population but too much government. If the developing world evolves into a liberal market order, it will find that it can have both reproductive freedom and prosperity. People are not problems; they're problem solvers.

Malthus Frontline

IF THE PREDICTIONS OF MALTHUS HAVE NOT COME TRUE IN 200 YEARS, THEY'RE NOT GOING TO…. EVER… THEY ARE UNSCIENTIFIC
DEMING 2004
[DAVID, University of Oklahoma 's School of Geology and Geophysics, MALTHUS RECONSIDERED, MARCH 22, http://www.ncpa.org/pub/ba/ba469/]

Empirical falsifications of Malthus' proposition are often met by the criticism that not enough time has passed for population growth to outstrip food production. But how much time is necessary to test the hypothesis? Is 200 years not enough? A hallmark of scientific hypotheses is that they make specific predictions that can be falsified. If Malthus' hypothesis cannot be falsified within any finite value of time, then its scientific status is questionable.

Demographic Transitions. Malthus did not foresee that technological changes would enable resource growth to outstrip population growth. Nor did he anticipate the demographic transition that takes place as societies move from agricultural to technological civilizations. Malthus thought that population increase in prosperous societies was a universal rule and called it an "incontrovertible truth."

DEFAULT TO OUR EVIDENCE – DOOM PREDICTIONS ARE EMPIRCALLY WRONG
THE ECONOMIST 1997
[PLENTY OF GLOOM, http://mscserver.cox.miami.edu/msc491/Readings/PlentyofGloom.htm, DECEMBER 18]

In 1865 an influential book by Stanley Jevons argued with equally good logic and equally flawed premises that Britain would run out of coal in a few short years' time. In 1914, the United States Bureau of Mines predicted that American oil reserves would last ten years. In 1939 and again in 1951, the Department of the Interior said American oil would last 13 years. Wrong, wrong, wrong and wrong.
This article argues that predictions of ecological doom, including recent ones, have such a terrible track record that people should take them with pinches of salt instead of lapping them up with relish. For reasons of their own, pressure groups, journalists and fame-seekers will no doubt continue to peddle ecological catastrophes at an undiminishing speed. These people, oddly, appear to think that having been invariably wrong in the past makes them more likely to be right in the future. The rest of us might do better to recall, when warned of the next doomsday, what ever became of the last one.

Empirical analysis shows more people means more productivity and technology
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 380-382

But is it certain that the recent acceleration of productivity would not have occurred if population had been smaller? The connections between numbers of scientists, inventors and ideas, and the adoption and use of new discoveries are difficult to delineate clearly. But the links needed to confirm this effect seem very obvious and strong. For example, the data show clearly that the bigger the population of a country, the greater the number of scientists and the larger the amount of scientific knowledge produced; more specifically, as seen in figure 26-4, scientific output is proportional to population size, in countries at the same level of income.36 The United States is much larger than Sweden or the Netherlands, and it produces much more scientific knowledge. Sweden and Holland benefit from the larger U.S. population because they "import" much more knowledge from the United States than the United States imports from Sweden and Holland; this can be seen in the references used in Swedish, Dutch, and U.S. scientific writings, and in the number of patented processes licensed from each other.
Additional evidence that more people cause a faster rate of technological advance comes from comparisons of productivity gains in various industries. This evidence is quite compelling, in my judgment. We observe that a given industry grows faster in some countries than in other countries, or than other industries in the same country. Comparisons of faster-growing and slower-growing industries show that, in the faster-growing industries, the rate of in-crease of productivity and technological practice is highest. This indicates that faster population growth—which causes faster-growing industries—leads to faster growth of productivity. We shall examine this in more detail in the next section. But once more the caution: Our subject is the effect of population upon productivity increase in the developed world as a whole. The discussion of particular countries is only a device to increase the size of the sample.

Malthus Frontline

Technological advancement is key to Type II and III civilizations – only they can create inter-universal wormholes to escape at the end of the universe
Slate.com in '04
(Jim Holt, "How Will The Universe End?" March 4, http://www.slate.com/id/2143403/entry/2096507/)

Tipler's idea of an infinite frolic just before the Big Crunch was seductive to me—more so, at least, than Dyson's vision of a community of increasingly dilute Black Clouds staving off the cold in an eternal Big Chill. But if the universe is in a runaway expansion, both are pipe dreams. The only way to survive in the long run is to get the hell out. Yet how do you escape a dying universe if—as little Alvy Singer pointed out—the universe is everything?
A man who claims to see an answer to this question is Michio Kaku. A theoretical physicist at City College in New York, Kaku looks and talks a bit like the character Sulu on Star Trek. (He can be seen in the recent Michael Apted film about great scientists, Me and Isaac Newton.) He is not the least bit worried about the fate of this universe. "If your ship is sinking," he said to me, "why not get a lifeboat and leave?" We earthlings can't do this just yet, Kaku observed. That is because we are a mere Type 1 civilization, able to marshal the energy only of a single planet. But eventually, assuming a reasonable rate of economic growth and technological progress, we will graduate to being a Type 2 civilization, commanding the energy of a star, and thence to being a Type 3 civilization, able to summon the energy of an entire galaxy. Then space-time itself will be our plaything. We'll have the power to open up a "wormhole" through which we can slip into a brand new universe.
"Of course," Kaku added, "it may take as long as 100,000 years for such a Type 3 civilization to develop, but the universe won't start getting really cold for trillions of years." There is one other thing that the beings in such a civilization will need, Kaku stressed to me: a unified theory of physics, one that would show them how to stabilize the wormhole so it doesn't disappear before they can make their escape. The closest thing we have to that now, superstring theory, is so difficult that no one (with the possible exception of Ed Witten) knows how to get it to work. Kaku wasn't the least bit gloomy that the universe might be dying. "In fact," he said, "I'm in a state of exhilaration, because this would force us, really force us, to crack superstring theory. People say, 'What has superstring theory done for me lately? Has it given me better cable TV reception?' What I tell them is that superstring theory—or whatever the final, unified theory of physics turns out to be—could be our one and only hope for surviving the death of this universe."

Over time increases in population generate more resources that leave us better than before population increased
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 402

Chapters 1—11 showed that all natural resources—minerals, food, and energy—have become less rather than more scarce throughout human history. But it is counterintuitive, against all common sense, for more people to result in more rather than less natural resources. So here is the theory again: More people, and increased income, cause problems of increased scarcity of re-sources in the short run. Heightened scarcity causes prices to rise. The higher prices present opportunity, and prompt inventors and entrepreneurs to search for solutions. Many fail, at cost to themselves. But in a free society, solutions are eventually found. And in the long run the new developments leave us better off than if the problems had not arisen. That is, prices end up lower than before the increased scarcity occurred.
The sequence by which the stock of new resources is increased was illustrated in a historical account, using the example of energy in England, in chapter 11. The reason for believing that this process will occur even with respect to resources for which we do not have historical data is discussed in chapter 4, "The Grand Theory" It may also help you understand the process by formalizing it in the form of a graph, showing the channels through which population influences the outcome.2

Population solves famine by increasing resource accessibility
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 94

Paradoxically, greater population density apparently leads to less chance of famine. A concentrated population builds better roads and transportation, and better transportation is the key factor in preventing starvation. Consider a reporter's account of the 1970s famine in the Sahel in West Africa.
"Sure, the food is pouring in," observed British Red Cross liaison officer George Bolton, "but how the hell are we going to get it to the people who need it? There isn't a tarred road within a thousand miles of Juba." Bolton wasn't exaggerating. While I was in Juba, I witnessed the arrival of 5,000 gallons of cooking oil, which had been diverted from the nearby state of Rwanda. Since the rickety old ferry was not strong enough to carry the oil shipment across the White Nile so it could be distributed to the needy in the interior, the oil was promptly unloaded on the riverbank and stored in Juba.

And this was not an isolated incident. I saw warehouses in Juba overflowing with millet, dried fish, cooking utensils, agricultural tools and medical supplies—all use-less because nothing could be delivered to the people who needed it.29 85

Extensions: Population Growth Key To Economic Growth

Overpopulation and population growth is key to economic growth
Phillip **Longman**, Senior Fellow at the New America Foundation, Foreign Affairs, "The Global Baby Bust", Volume 83, Issue 3, May/June 20**04**, Proquest

Population aging also depresses the growth of government revenues. Population growth is a major source of economic growth: more people create more demand for the products capitalists sell, and more supply of the labor capitalists buy. Economists may be able to construct models of how economies could grow amid a shrinking population, but in the real world, it has never happened. A nation's GDP is literally the sum of its labor force times average output per worker**. Thus a decline in the number of workers implies a decline in an economy's growth potential**. When the size of the work force falls, economic growth can occur only if productivity increases enough to compensate. And these increases would have to be substantial to offset the impact of aging. Italy, for example, expects its working-age population to plunge 41 percent by 2050 -- meaning that output per worker would have to increase by at least that amount just to keep Italy's economic growth rate from falling below zero. With a shrinking labor supply, Europe's future economic growth will therefore depend entirely on getting more out of each remaining worker (many of them unskilled, recently arrived immigrants), even as it has to tax them at higher and higher rates to pay for old-age pensions and health care.

STRONG ANTI-GORWTH POLICIES LEAD TO UNDERPOPULATION AND ECONOMIC AND POLITICAL STAGNATION
Cesare **Bonivento**, Bishop, Population Research Institute Review, "Does More Population Mean More Poverty in a Nation?" January/February **2005**, http://www.pop.org/main.cfm?id=266&r1=1.00&r2=3.00&r3=93.00&r4=1.00&level=4&eid=781 Does More Population Mean More Poverty in a Nation?

The article forgets to cite those countries which, despite doubling their population, achieved an incredible economic growth. As we said before, this is the case with India, which was affected by a terrible shortage of food 40 years ago, when its population was not more than 500 million. Now it is a country exporting food and developing rapidly even though the population is more than a billion. It is also the case with China, which is a superpower now even though its population doubled. It is the same with Korea, with Italy and with other countries.
The article does not mention the bad experiences of all those countries which endorsed a strong contraception policy, and now they are facing the problem of underpopulation, and especially the problem of an aging population, and therefore they are obliged to open their borders to millions and millions of foreign workers in order to sustain their development. It is the case of all Europe, but in a special way of Italy, Germany, France, Spain and Russia. The latter is sinking in terms of population, gravely jeopardizing its development. Russia is not considered a superpower any more.

Extensions: Population Growth Key To Economic Growth

Population growth is key to economic growth
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, 19**95**
[SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

The catastrophists' clich that a growing population is an obstacle to development is especially barren. Studies show a strong correlation between affluence and longevity; as the late Aaron Wildavsky liked to say, wealthier is healthier. The lengthening life expectancy in the developing world is evidence that population growth cannot be increasing poverty.
History makes the same point. The West grew rich precisely when its population was increasing at an unprecedented rate. Between 1776 and 1975, while the world's population increased sixfold, real gross world product rose about 80-fold.
In our own century we have seen a replay of the Industrial Revolution. After World War II the population of Hong Kong grew more quickly than that of 19th-century England or 20th-century India--at the same time that resource-poor island-colony was growing rich.
The increases in population and wealth have not been merely coincidental. They are causes and effects of each other. Today, with few exceptions, the most densely populated countries are the richest. Any mystery in that is dispelled by the realization that people are the source of ideas. The addition of people geometrically increases the potential for combining ideas into newer, better ideas. As the Nobel laureate and economist Simon Kuznets wrote, "More population means more creators and producers, both of goods along established production patterns and of new knowledge and inventions." A growing population also allows for a more elaborate division of labor, which raises incomes. Those who wish to stifle population growth would condemn hundreds of millions of people in the developing world to the abject deprivation that characterized the West before the Industrial Revolution

A2: Population Hurts Economic Growth

No convincing evidence that population growth hurts economic growth – it actually bolsters technology through the creation of human capital
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 482

You might check the conclusions drawn from this model with your intuition about whether all the people in the United States would be better off today if there had been half as many people in 1800 or 1850 or 1900 or 1950 as there actually were. It is plain that our ancestors bestowed benefits upon us through the knowledge they created and the economies of scale they left us, and if there had been fewer of those ancestors the legacy would have been smaller. It is worth keeping this in mind when speculating about whether life today and in the future would be better if there were fewer people alive today.
Population models such as the one presented here were not accepted before the 1980s because of the preeminence of physical capital in the thinking of economists then. But there has been recognition in recent years of the fundamental importance of knowledge, education, and the quality of the labor force in the productive process." The empirical studies that show the absence of a negative effect of population growth on economic development also have affected the thinking of economists. As a result, the sort of model described here—allowing for the contribution of additional people to technology and human capital—is much more congenial to economists than at the time of the first edition of this book.
Despite the prevailing attitude against population growth, there never has been any scientifically valid evidence that population growth has a negative effect on the standard of living. The President's Commission on Population Growth and the American Future of the early 1970s sought hard to find such evidence. The Commission's creators clearly hoped and expected that it would bring in a report that called strongly for fertility reduction. Indeed, as then-President Nixon put it in a message to Congress, "Population growth is a world problem which no country can ignore."1z But despite its antinatalist origin, the worst the Commission could say was, "We have looked for and have not found any cyincing economic argument for continued national population growth."13

Extensions: Population Stabilizing In Status-Quo

POPULATION WILL START TO DECREASE – BELOW REPLACEMENT BY 2050

Cesare **Bonivento**, Bishop, Population Research Institute Review, "Does More Population Mean More Poverty in a Nation?" January/February **2005**, http://www.pop.org/main.cfm?id=266&r1=1.00&r2=3.00&r3=93.00&r4=1.00&level=4&eid=781 Does More Population Mean More Poverty in a Nation?

On February 28, 2003, we had a warning issued by the UN about below-replacement fertility levels. For the first time, the United Nations Population Division foresaw that future fertility levels in most developing countries will likely fall below 2.1 children per woman, the level needed to ensure the long-term replacement of the population. By 2050, the UN document says, *three out of every four countries in the less developed regions will be experiencing below-replacement fertility, with all developed countries far below replacement level as well.*

Populations will decline in 33 countries by 2050, according to the report, with countries such as Italy projected to be 22% smaller and the Russian Federation nearly 50% smaller.

THE POPULATION IS NOT INCREASING, ACCORDING TO THE UN

James M. **Taylor**, Senior Fellow at the Heartland Institute, Environment News, "U.N. Study Ends Overpopulation Fears", May 1, **2002,** http://www.heartland.org/Article.cfm?artId=9243

On second thought, the world is not going to suffer from ever-growing, catastrophic overpopulation in the foreseeable future, according to a new report issued by the United Nations Population Division.

Catastrophic overpopulation has been a controversial yet consistent prediction by many environmental activist groups since the middle of the last century. Although advances in human technology, particularly in regard to food cultivation and medicine, led to phenomenal increases in human life expectancy during the twentieth century, alarmists have warned that the day will soon come when technology cannot keep up with exponential human growth. Whether or not technology would actually be able to do so will apparently become a moot question, according to the U.N.

Below-replacement fertility now expected

In its March 11 report, "The Future of Fertility in Intermediate-Fertility Countries," the U.N. Population Division has dramatically reduced its world fertility projections. Instead of an ever-growing world population, the U.N. now concludes that, "The state of current knowledge, buttressed by the actual experience of a growing number of countries, suggests that lengthy periods of below-replacement fertility are likely to be common in the future."

Given the advances in medicine and other factors, fertility rates of 2.1 children per woman are necessary to sustain current human population levels. In previous projections, the U.N. noted many portions of the world, including most of East Asia, much of the Caribbean, and most of Europe, were already demonstrating below-replacement fertility rates. In those projections, however, the U.N. predicted fertility levels in such low-fertility countries would eventually rise to 2.1 children per woman. The tendency to gravitate to the fertility replacement number, the U.N. believed, was somehow "hardwired" into the human psyche.

FERTILITY RATES ARE FALLING INCREDIBLY FAST; THE UN PREDICTS THAT ALMOST ALL COUNTRIES WILL BE BELOW REPLACEMENT RATE BY MID CENTURY

James M. **Taylor**, Senior Fellow at the Heartland Institute, Environment News, "U.N. Study Ends Overpopulation Fears", May 1, **2002,** http://www.heartland.org/Article.cfm?artId=9243

However, decades of below-replacement fertility in those countries have shown that no such rebound in fertility is occurring. Nations that are below replacement level will likely remain there.

As importantly, the U.N. now acknowledges fertility levels in many "intermediate-fertility" countries (those nations with fertility levels of 2.1 to 5.0 children per woman) are dropping more quickly than anticipated. Some of those countries are demonstrating fertility levels a full child lower than had been previously predicted.

Coupled with the empirical reality that nations that fall below the replacement fertility level have not gravitated back to the 2.1 break-even figure, the U.N. now finds it likely "approximately 80 percent of the world population will be projected to have below-replacement fertility before mid-century."

Extensions: Population Stabilizing in Status-Quo

POPULATION IS STABILIZING FASTER THAN EXPERTS BELIEVED POSSIBLE; CHILDREN ARE BECOMING LESS VALUABLE, MORE HARDY, AND MORE EXPENSIVE TO RAISE

Joseph L**. Bast,** President and CEO of the Heartland Institute, Heartland Perspectives, "Ending the Myth of Overpopulation", July 8, **1999**, http://www.heartland.org/Article.cfm?artId=629)

According to the United Nations' own figures, the global population growth rate peaked around 1970 and has fallen steadily since then. Just seven years ago, experts predicted the world's population would reach 12 billion before stabilizing around the year 2150. Today, their best guess is that population will peak at only 9 billion in the year 2050. Population growth is slowing faster than even most experts thought was possible.
Population growth is falling for several reasons. Rising standards of living bring with them pensions and other retirement benefits, so fewer parents need to have large numbers of children to provide for them in their old age. Lower infant mortality rates mean parents can have a small number of children and still be assured that some of them will survive to adulthood. The education of women and their admission into the labor market have made child-bearing and child-rearing "more expensive" relative to other opportunities.

No risk of overpopulation- the rate of world population growth is declining and birthrates are falling

Phillip **Longman**, Senior Fellow at the New America Foundation, Foreign Affairs, "The Global Baby Bust", Volume 83, Issue 3, May/June **2004,** Proquest

Yet a closer look at demographic trends shows that the rate of world population growth has fallen by more than 40 percent since the late 1960s. And forecasts by the UN and other organizations show that, even in the absence of major wars or pandemics, the number of human beings on the planet could well start to decline within the lifetime of today's children. Demographers at the International Institute for Applied Systems Analysis predict that human population will peak (at 9 billion) by 2070 and then start to contract. Long before then, many nations will shrink in absolute size, and the average age of the world's citizens will shoot up dramatically. Moreover, the populations that will age fastest are in the Middle East and other underdeveloped regions. During the remainder of this century, even sub-Saharan Africa will likely grow older than Europe is today.
FREE FALLING
The root cause of these trends is falling birthrates. Today, the average woman in the world bears half as many children as did her counterpart in 1972. No industrialized country still produces enough children to sustain its population over time, or to prevent rapid population aging. Germany could easily lose the equivalent of the current population of what was once East Germany over the next half-century. Russia's population is already contracting by three-quarters of a million a year. Japan's population, meanwhile, is expected to peak as early as 2005, and then to fall by as much as one-third over the next 50 years -- a decline equivalent, the demographer Hideo Ibe has noted, to that experienced in medieval Europe during the plague.
Although many factors are at work, the changing economics of family life is the prime factor in discouraging childbearing. In nations rich and poor, under all forms of government, as more and more of the world's population moves to urban areas in which children offer little or no economic reward to their parents, and as women acquire economic opportunities and reproductive control, the social and financial costs of childbearing continue to rise.
In the United States, the direct cost of raising a middle-class child born this year through age 18, according to the Department of Agriculture, exceeds $200,000 -- not including college. And the cost in forgone wages can easily exceed $1 million, even for families with modest earning power. Meanwhile, although Social Security and private pension plans depend critically on the human capital created by parents, they offer the same benefits, and often more, to those who avoid the burdens of raising a family.
Now the developing world, as it becomes more urban and industrialized, is experiencing the same demographic transition, but at a faster pace. Today, when Americans think of Mexico, for example, they think of televised images of desperate, unemployed youths swimming the Rio Grande or slipping through border fences. Yet because Mexican fertility rates have dropped so dramatically, the country is now aging five times faster than is the United States. It took 50 years for the American median age to rise just five years, from 30 to 35. By contrast, between 2000 and 2050, Mexico's median age, according to UN projections, will increase by 20 years, leaving half the population over 42. Meanwhile, the median American age in 2050 is expected to be 39.7.
Those televised images of desperate, unemployed youth broadcast from the Middle East create a similarly misleading impression. Fertility rates are falling faster in the Middle East than anywhere else on earth, and as a result, the region's population is aging at an unprecedented rate. For example, by mid-century, Algeria will see its median age increase from 21.7 to 40, according to UN projections. Postrevolutionary Iran has seen its fertility rate plummet by nearly two-thirds and will accordingly have more seniors than children by 2030.
Countries such as France and Japan at least got a chance to grow rich before they grew old. Today, most developing countries are growing old before they get rich. China's low fertility means that its labor force will start shrinking by 2020, and 30 percent of China's population could be over 60 by mid-century. More worrisome, China's social security system, which covers only a fraction of the population, already has debts exceeding 145 percent of its GDP. Making demographics there even worse, the spreading use of ultrasound and other techniques for determining the sex of fetuses is, as in India and many other parts of the world, leading to much higher abortion rates for females than for males. In China, the ratio of male to female births is now 117 to 100 -- which implies that roughly **one out of six males in today's new generation will not succeed in reproducing.**
All told, some 59 countries, comprising roughly 44 percent of the world's total population, are currently not producing enough children to avoid population decline, and the phenomenon continues to spread. By 2045, according to the latest UN projections, the world's fertility rate as a whole will have fallen below replacement levels.

Extensions: Population Stabilizing In Status-Quo

Population will stabilize and then decline in the status-quo
Anthony C. **LoBaido,** Writer for Worldnetdaily, "The overpopulation lie: Mass abortion, 'gendercide,' junk science leading to under-population crisis", May 2, **2000**, http://www.worldnetdaily.com/news/article.asp?ARTICLE_ID=19076

Yet, while the one-billionth citizen of India was born last year, Japan, if it continues its current abortion policies and fails to raise its average birth rate of 1.4 children per married couple, will have fewer than 500 people by the year 3000. This is not a prophecy of the mad Aum Shinrikyo cult, but rather a pronouncement of Japan's Ministry of Health and Welfare.
If these two Hong Kong children, Stephanie and Shan Shan, had been born a just few miles north of Kowloon Island, in mainland China, they would very possibly have become victims of the Asian gendercide of abortion.
There are now 6 billion people on Earth. The planet's population will most likely continue to climb until 2050, when it will peak at 9 billion. Other predictions have the world's population peaking at 7.5 billion in 2040. In either case, it will then go into a sharp decline. The world may soon be facing an under-population crisis -- a prospect that has all but escaped media scrutiny.

We control uniqueness – population stabilization inevitable without mass die-off
David **Deming**, Professor of Geology and Geophysics at the University of Oklahoma and Adjunct Scholar with the National Center for Policy Analysis, Brief # 469, "Malthus Reconsidered", March 22, **2004**, http://www.ncpa.org/pub/ba/ba469/

Demographic Transitions. Malthus did not foresee that technological changes would enable resource growth to outstrip population growth. Nor did he anticipate the demographic transition that takes place as societies move from agricultural to technological civilizations. Malthus thought that population increase in prosperous societies was a universal rule and called it an "incontrovertible truth."
In his memorable 1968 essay Tragedy of the Commons , Garrett Hardin (1968, p. 1,244) noted that "there is no prosperous population in the world today that has, and has had for some time, a [population] growth rate of zero." If this was true in 1968, it is no longer true today. The birthrate necessary for zero population growth is 2.1 births per woman. The birthrate in many developed countries is now substantially lower than the minimum required to replace the population. For instance:
*Japan has a total fertility rate of 1.3 births per woman, and its population is projected to fall 21 percent by 2050.
*The total fertility rate for Europe in 2002 was 1.4 births per woman, and the population is projected to fall 11 percent by 2050.
*Developed regions of the world — Europe, North America, Australia, Japan and New Zealand — have 19 percent of the world's population and an average fertility rate of 1.6 births per woman.
In less developed areas the fertility rate has also fallen dramatically and continues to decline:
*In the 1950s, the average woman in Africa , Asia and Latin America gave birth to 6 children.
*By 2002, the average fertility rate in these less developed areas had fallen to 3.1 births per woman.
Among the reasons that have been given for the falling birth rates that accompany economic development:
* In agrarian societies, children are an economic asset, whereas in technological societies they are an economic liability.
* Birth control has become increasingly available and culturally acceptable.
* Infant mortality has fallen.
* Women in technological societies spend more time on education and work, and less time on childbearing and rearing.
In retrospect, it is now apparent that a turning point in the history of human population growth took place in the period from 1962 to 1963. In those years, the Earth's human population reached its highest growth rate — 2.2 percent per year. Since then, the growth rate has decreased, reaching 1.2 percent in 2001. If this trend continues , the world's population will likely stabilize and perhaps even begin declining before the end of this century.

Extensions: Population Growth Key To Space

Population growth is key to space
Bainbridge in '01
(William Sims, Ph.D., "The Spaceflight Revolution Revisited", May 8, http://mysite.verizon.net/wsbainbridge/dl/spacerevisit.htm)

Some say that the pressure of population growth on Earth will force humanity to colonize other worlds. Perhaps the most plausible version of this scenario was suggested in Kim Stanley Robinson's series of novels about terraforming Mars: The rich ruling classes might want to develop Mars as a home for themselves when Earth becomes unendurably overpopulated.[16]

OVERCROWDING ON EARTH WILL FORCE OUR DESCENDANTS INTO OUTER SPAACE
SHOSTAK, SETI INSTITUTE**, 2006**
[SETH, WHY WE MUST FLEE THE PLANET, http://www.space.com/searchforlife/060629_seti_thursday.html]

Such fanciful extrapolations are unrealistic, but so is the opposite extreme: to assume that, after 300 thousand years of increase, the number of humans will stabilize and stagnate, not just for a while, but forever. More room is surely needed, unless you can picture our progeny endlessly stuck on a single planet, fighting for space and hustling for the dwindling natural resources. That scenario seems so fanciful, so airy-fairy, we have no choice but to heed the siren call of other solar system habitats. However, even the best of these (Mars) will be difficult to terraform, and offers only a short-term solution to a long-term problem. Another well-known physicist, Freeman Dyson, weighed in on this issue years ago, and suggested that the small bodies of our solar system—asteroids and perhaps the diminutive worlds of the Kuiper Belt—could be choice future real estate. These objects, like the planets, are approximately round, but being small they enjoy a higher ratio of surface area to volume. All the asteroids together weigh only as much as Earth, but these hunky chunks of junk still sport ten thousand times as much square footage as our world. Dyson reckons that our descendants will migrate to where land is abundant.

Extensions: Malthusian Ethics Is Racist

POPULATION POLICIES ARE INTRICATELY SET IN A SYSTEM OF EUGENICS
Gabriele **Liebig**, Editor of the German Weekly Neue Solidarität and Executive Committee member of the International Caucus of Labor Committees in Europe, The American Almanac, "Eugenics and Population Control: The 1935 Nazi World Population Conference, and the 1994 U.N. Cairo Population Conference -- More of the Same", **1994**, http://members.tripod.com/~american_almanac/eugenics.htm

The organizers of the global population conference in Cairo, too, link population policy to eugenics. This was confirmed on May 10, 1994 by a certain Mayone Stycos, professor of demography and sociology at Cornell University, during a World Population Foundation conference in Stockholm. A journalist from Executive Intelligence Review magazine asked Professor Stycos whether the Cairo conference can be seen as a continuation of the 1932 eugenics conference in New York. Not the least shocked or affronted, Professor Stycos replied that the eugenics movement had accomplished important things, and in the interim ``scientific and technical breakthroughs" were made, referring to better methods of contraception and sterilization. ``If you go to the Cairo conference, you'll find that a lot of it revolves around eugenics."
Latterday population experts like Stycos put forth their own special ``racial criteria": Africans and Chinese are clearly unworthy of possessing technology. For China, ``birth control is more important than economic development," Stycos declared in his Stockholm speech. ``It would be a catastrophe if every Chinese had a refrigerator."

POPULATION CONTROLS MIRROR HITLER'S DESTRUCTION OF THE SLAVS; THE WEST SEES OTHER ETHNICITIES PROLIFERATING, AND DECIDES THERE ARE TOO MANY
Gabriele **Liebig,** Editor of the German Weekly Neue Solidarität and Executive Committee member of the International Caucus of Labor Committees in Europe, The American Almanac, "Eugenics and Population Control: The 1935 Nazi World Population Conference, and the 1994 U.N. Cairo Population Conference -- More of the Same", **1994**, http://members.tripod.com/~american_almanac/eugenics.htm

The U.N. Population Fund and the worldwide Malthusian propaganda apparatus deem the poor countries of the Third World ``overpopulated." Despite the accelerating decline in births in the developing countries since the 1970s, from 6.1 to 3.9 children per mother, it is claimed that the black, brown, and yellow people there are still far too prolific.
In the 1930s, mortality was still so high in the Third World that no one considered its demographic trends a threat; the Nazis' overpopulation propaganda was directed against the Slavs. Dr. Friedrich Burgdoerfer, director of the Reich's Statistical Office, asserted at the Berlin world population conference in solemnly objective tones, that by the year 1960 Slavs would make up over half the European population, while the proportion of Germans would shrink to one-fourth. He illustrated his speech with charts which were later reprinted in numerous Nazi propaganda documents. They show a remarkable similarity to current portrayals of the Third World's growing share of the total population of the earth.

Extensions: Malthusian Ethics Is Racist

POPULATION CONTROL IS ANALAGOUS TO HITLER'S FINAL SOLUTION – TOTALITARIAN IMPOSITION OF MURDER TO CORRECT OVERPOPULATION

Gabriele **Liebig**, Editor of the German Weekly Neue Solidarität and Executive Committee member of the International Caucus of Labor Committees in Europe, The American Almanac, "Eugenics and Population Control: The 1935 Nazi World Population Conference, and the 1994 U.N. Cairo Population Conference -- More of the Same", **1994**, http://members.tripod.com/~american_almanac/eugenics.htm

A secret U.S. government document dated Dec. 10, 1974, promulgated under the direction of then-National Security Advisor Henry Kissinger and first declassified in 1990, bears the title ``Implications of Worldwide Population Growth for U.S. Security and Overseas Interests.'' The document, National Security Study Memorandum 200, expresses the fear that population growth in the Third World will endanger U.S. strategic raw-materials supplies. Securing ``the smooth flow of needed materials'' requires a ``slow or zero growth in population'' in the raw-materials-producing nations, in the security interests of the United States. [Further excerpts from National Security Study Memorandum 200 can be found in ``The genocidal roots of Bush's `New World Order,'|'' EIR Special Report, Wasington, D.C., May 1992. The memorandum was declassified on June 6, 1990, and can be examined at the National Archives in Washington, D.C.]

The comparison here which suggests itself is to Hitler's 1941 Generalplan Ost for the occupied territories of Eastern Europe. Through the use of raw materials and food production in Poland and Ukraine, as well as the exploitation of ``surplus'' labor there, the Nazis intended to make Germany ``blockade-proof'' and to ensure supplies for both the Wehrmacht and the home front. Part of this strategy was the extermination of European Jews, down to the Final Solution in the death camps. At the same time, the ``overpopulation'' in occupied Eastern Europe was to be eliminated through a systematic plan for population reduction. By means of state-sponsored birth control, abortion, deportation, calculated starvation, and mass murder, the population of Poland, the Baltic nations, Byelorussia, and western Ukraine was to be reduced by half or more.

ATTEMPTING TO NEGATE GROWTH TRENDS IN THE POPULATION IS THE SAME AS WHAT HITLER DID TO QUELL DISIDENCE

Gabriele **Liebig**, Editor of the German Weekly Neue Solidarität and Executive Committee member of the International Caucus of Labor Committees in Europe, The American Almanac, "Eugenics and Population Control: The 1935 Nazi World Population Conference, and the 1994 U.N. Cairo Population Conference -- More of the Same", **1994**, http://members.tripod.com/~american_almanac/eugenics.htm

Since 1990 at the latest, the United Nations' Population Fund's population strategy has made no secret of the goal set for the gigantic birth-control army the Cairo Action Plan would still further expand. The goal is to bring population growth in the developing nations to a halt as soon as possible, and to reduce total world population in the next 150 years to half the number of people living today. The basis, as it was in the 1930s, is an ideologically warped demographic theory which portrays all economic, social, and environmental problems as results of ``overpopulation,'' whereas conversely, ``the smaller the total population finally becomes, the more room our children and grandchildren will have.'' In other words, the elimination of ``excess people,'' the reduction of ``population pressure,'' is presented as the solution to every problem.

Birth control and abortion were part of the Nazis' depopulation arsenal, too. Reichsleiter Martin Bormann, the personal aide to Adolf Hitler, wrote to Ostminister Alfred Rosenberg on July 23, 1942: ``If girls and women in the occupied Eastern zone abort their children, that can only be to our advantage.... According to the Führer's attitude, it is even necessary to allow full-scale traffic in contraceptives in the occupied territories, because we can have no stake whatever in an increase in the non-German population.''

Malthusian Ethics Bad

Embracing death is wrong – population control is not morally justified by preventing starvation
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. xxxii

The longer I have read the literature about population, the more baffled and distressed I have become that one idea is omitted: Enabling a potential human being to come into life and to enjoy life is a good thing, just as protecting a living person's life from being ended is a good thing. Of course a death is not the same as an averted life, in large part because others feel differently about the two. Yet I find no logic implicit in the thinking of those who are horrified at the starvation of a comparatively few people in a faraway country (and apparently more horrified than at the deaths by political murder in that same faraway country, or at the deaths by accidents in their own country) but who are positively gleeful with the thought that a million or ten million times that many lives will never be lived that might be lived.

The call for lower population s based on an anti-life ethic – we have no right to gamble with others lives especially when no compelling evidence indicates a need for reduced population
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. xxxii-xxxiii

I can suggest to Davis and Ehrlich more than one reason for having more children and taking in more immigrants. Least important is that the larger population will probably mean a higher standard of living for our grandchildren and great-grandchildren. (My technical 1977 and 1992 books and a good many chapters in this book substantiate that assertion.) A more interesting reason is that we need another person for exactly the same reason we need Davis and Ehrlich. That is, just as the Davises and Ehrlichs of this world are of value to the rest of us, so will the average additional person be of value.
The most interesting reason for having additional people, however, is this: If the Davises and Ehrlichs say that their lives are of value to themselves, and if the rest of us honor that claim and say that our lives are of value to us, then in the same manner the lives of additional people will be of value to those people themselves. Why should we not honor their claims, too?
If Davis or Ehrlich were to ask those twenty-three million Americans born between 1960 and 1970 whether it was a good thing that they were born, many of them would be able to think of a good reason or two. Some of them might also be so unkind as to add, "Yes, it's true that you gentlemen do not personally need any of us for your own welfare. But then, do you think that we have greater need of you?"
What is most astonishing is that these simple ideas, which would immediately spring to the minds of many who cannot read or write, have never come into the heads of famous scientists such as Davis and Ehrlich—by their own admission. And by repeating the assertion in 1991, Ehrlich makes it clear that he does not consider the above ideas, which I suggested to him earlier, to be "sensible."
The absence of this basic value for human life also is at the bottom of Ehrlich's well-known restatement of Pascal's wager. "If I'm right, we will save the world [by curbing population growth]. If I'm wrong, people will still be better fed, better housed, and happier, thanks to our efforts. [All the evidence suggests that he is wrong.] Will anything be lost if it turns out later that we can support a much larger population than seems possible today?"5
Please note how different is Pascal's wager: Live as if there is God, because even if there is no God you have lost nothing. Pascal's wager applies entirely to one person. No one else loses if she or he is wrong. But Ehrlich bets what he thinks will be the economic gains that we and our descendants might enjoy against the unborn's very lives. Would he make the same sort of wager if his own life rather than others' lives were the stake? (Chapter 39 has more to say about the morality of betting other people's lives.)
I do not say that society should never trade off human life for animals or even for nonliving things. Indeed, society explicitly makes exactly this trade-off when a firefighter's life is lost protecting a building or a forest or a zoo, and neither I nor hardly anyone else says it should not be so. And I have no objection in principle to the community taxing its members for the cost of parks or wilderness or wildlife protection (although a private arrangement may be better) any more than I object to taxes for the support of the poor. But according to my values, we should (1) have a clear quantitative idea of the trade-offs we seek to make, rather than make them on some unquantified principle such as "the loss of a single human being [or of a single nonhuman species or animal] is obscene," implying that the costs of saving that entity should not be reckoned; (2) recognize that economic science does not show that a greater number of human beings implies slower economic development or a lower standard of living in the long run; and (3) understand that foregoing the births of additional human beings is costly according to the value systems of some other human beings.

Malthusian Ethics Bad

Population growth is ethical on the grounds of promoting greater happiness for all – valuing the deaths of other human beings is immoral
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p.563-564

The value that in the past I subscribed to as a criterion for decisions about population growth is one that I think a great many other people also subscribe to, as they will find if they inspect their beliefs closely. In utilitarian terms it is "the greatest good for the greatest number." Under the influence of Hayek's writing, however, I no longer rely on this value because the idea of adding people's happinesses is fraught with difficulties so great that it is unworkable. Instead, I now use what I call the "expanded Pareto optimum"—that is, that if no one is made worse off, and there are more people to enjoy life, that is a preferable state of affairs. And in the long run, population growth is consistent with a larger expanded Pareto optimum.
Other things being equal, a greater number of people is a good thing, ac-cording to this value criterion. If forced to choose, I might well prefer to have more people and a lower per capita income in the immediate future. But even if such conditions were to exist, any income decline would be only temporary; in the long run, per capita income will be higher if there are more children (or more immigrants) now. Hence this choice is an unlikely one.
(This leaves aside the issue that any trade-off between fewer people and less income implies government coercion, which I would find odious even if there were an economic argument in its favor—which there is not.)
This criterion seems to be consistent with our other values—our abhorrence of killing, and our desire to prevent disease and early death. Indeed, why should we feel so strongly that murder is bad, and that children in war-torn countries should be saved, and then not want to bring more people into the world? If life is good and worth supporting, why does preventing murder make sense, but not encouraging births? I understand well that a death causes grief to the living—but I am sure that your abhorrence of killing would also extend to the extermination of a whole group at once, under which conditions there would be no one to suffer grief. So, what are the differences between the murder of an adult, the infanticide of another's child, and the coercion of someone else not to have a child? The main difference between murder and forcing someone not to bear children is that murder threatens our own per-sons, and unregulated murder would rip up the fabric of our society—good reasons indeed to be against murder. But we also condemn murder on the moral ground that murder denies life to someone else—and in this respect (and only in this respect) it seems to me that there is no difference between murder, abortion, contraception, and abstinence from sex. *

Extensions: There's Enough Food

DESPITE A FIVE BILLION PERSON GROWTH IN THE WORLD POPULATION, FOOD PER CAPITA HAS CONTINUED TO INCREASE SINCE MALTHUS' TIME
DEMING 2004
[DAVID, University of Oklahoma 's School of Geology and Geophysics, MALTHUS RECONSIDERED, MARCH 22, http://www.ncpa.org/pub/ba/ba469/]

The Facts. Malthus' thesis can also be tested scientifically. As Malthus himself noted, "a just theory will always be confirmed by experiment." Since Malthus first published more than 200 years ago, arguably enough time has passed to determine whether or not he was correct. From 1800 to 2000, world population increased from about 1 to 6 billion. According to Malthus' thesis, per capita food consumption for the world should now be lower than in 1800. While historical food-production data are difficult to find, proxies indicate that per capita food production has increased over the last 200 years.
* From 1600 through 1974, the percentage of the population in Great Britain employed in agriculture dropped from 67 percent to about 6 percent.
* From 1800 through 1990, the price of wheat in the United States — expressed as a percentage of wages — fell 96 percent.
* From 1800 to 2000, the population of England and Wales increased from about 9 million to more than 50 million while the inflation-adjusted price of wheat fell by more than 90 percent.
* From 1961 through 1998, the world population increased from 3.1 billion to 5.9 billion — but over the same time period world daily average consumption of food calories increased from 2,250 to 2,800.

The preceding facts would seem to falsify Malthus' hypothesis.

THERE IS AND ALWAYS WILL BE ABUNDANT FOOD; THE GREEN REVOLUTION MEANS WE'LL NEVER GO HUNGRY
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, **1995** [SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

Food is abundant. Since 1948, according to the UN Food and Agriculture Organization and the U.S. Department of Agriculture, annual world food production has outpaced the increase in population. Today, per capita production and per-acre yields are at all-time highs. Prices of agricultural products have been falling for over 100 years. The average inflation-adjusted price of those products, indexed to wages, fell by more than 74 percent between 1950 and 1990. While Lester Brown of the Worldwatch Institute and the noted butterfly expert Paul Ehrlich predict higher food prices and increasing scarcity, food is becoming cheaper and more plentiful. That good news is due largely to technological advances (the "green revolution") that have provided better seeds, fertilizers, pesticides, and methods of farming. The only obstacles to agricultural progress are the impediments created by governments. Imagine what the world would be like today if the fertile farmland of the former Soviet Union or China or India had been in productive private hands operating in free markets for the past several decades. Since permitting market incentives in agriculture, India has been come a net food exporter and agricultural production in China has boomed.

EVEN IN THE THIRD WORLD, FOOD PRODUCTION IS INCREASING. WHILE THE POPULATION HAS DOUBLED, FOOD SUPPLIES HAVE MORE THAN DOUBLED
THE ECONOMIST 1997
[PLENTY OF GLOOM, http://mscserver.cox.miami.edu/msc491/Readings/PlentyofGloom.htm, DECEMBER 18]

The facts on world food production are truly startling for those who have heard only the doomsayers' views. Since 1961, the population of the world has almost doubled, but food production has more than doubled. As a result, food production per head has risen by 20% since 1961 (see chart 2). Nor is this improvement confined to rich countries. According to the Food and Agriculture Organisation, calories consumed per capita per day are 27% higher in the third world than they were in 1963. Deaths from famine, starvation and malnutrition are fewer than ever before.

A2: Population Hurts Environment

STATISM CAUSES ENVIRONMENTAL DAMAGE – MALTHUSIAN RISKS ARE TOTALLY DISPROVED
James M. **Taylor,** Senior Fellow at the Heartland Institute, Environment News, "U.N. Study Ends Overpopulation Fears", May 1**, 2002**, http://www.heartland.org/Article.cfm?artId=9243

"These days almost no sane person gives any credence to the population bomb hysteria that was all the rage in the 1960s and 1970s," counters Stephen Moore, director of fiscal studies at the Cato Institute. "Every prediction of massive starvations, eco-catastrophes of biblical proportions and $100 a barrel oil has been discredited by the global economic and environmental progress of the past quarter-century. Intellectually, the Malthusian limits to growth menace is stone dead."
Adds Moore, "A vote for [population control] is a vote for a fanatical anti-people creed that holds that we should celebrate the planting of a tree, or a litter of three baby seals, but that we should regard the birth of a human couple's third baby in China or India or even the United States as eco-terrorism.
"The cause of world hunger and environmental disasters in the world today is not too many people. It is too much statism. Almost all of the greatest ecological damage of the past 50 years was perpetrated by the socialists behind the iron curtain."

More people reduces the level of pollution in their own lifetimes preventing catastrophe
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 436-437

Furthermore, additional people can also improve the chances of reducing pollution even in their own generation, because additional people create new solutions for problems, as well as creating new problems. Let's consider a poor-country example: Higher population density may increase the chance of communicable disease. But higher population density also is the only force that really gets rid of malaria, as we shall see in the next chapter, because the swamps that breed malaria-carrying mosquitoes do not co-exist with settled fields and habitation. And of course, if population growth had never occurred, there would not likely have been the growth of civilization and science that led to the existing armamentarium of pharmaceutical weapons against malaria and improved methods of fighting mosquitoes.
On balance, then, we must put onto the scales not only the increased chance of a pollution catastrophe induced by more people; we must also weigh the benefits of the new knowledge the additional people create to control pollutants and their ill consequences. So it is not at all clear whether the chance of catastrophe (involving ten thousand or one million people) is greater with a world population of six trillion or six billion, or with a growth rate of 2 percent or 1 percent yearly.

Over the long-term increases in population raise income which reduces pollution levels
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 433

It is not sound, though, to assume that all else is equal. When pollution increases, political forces arise to fight it; this is the force that warred against smoke pollution in Great Britain at the local level beginning centuries ago, and that has had success since the nineteenth century (see chapter 9). Once this process begins, the result may well be less pollution than earlier—or, of course, nothing may happen for a while except an even worse level of pollution.
Also as a result of a higher population, and of the higher income that occurs after a while, new techniques emerge to handle the temporarily worse problems of pollution. And eventually there results a cleaner world than before population and income grew Regarding any particular period in the near future, especially in poor countries, the overall outcome simply cannot be known in advance; neither economic logic nor political history can predict with confidence whether the intermediate-run result of the larger population and of the initially higher pollution will be a situation better or worse than if the population had not grown so large. Yet we must keep in mind the empirical fact that over the longest sweep of human history, while population has grown enormously, total pollution—as measured by life expectancy, and by the rate of deaths due to socially transmitted and socially caused diseases such as cholera and smog-caused emphysema—has fallen markedly. We do not live amongst ever-more-huge garbage dumps infested by rats, as in earlier times.

A2: Not Enough Room/Land

No internal link- there is PLENTY of room on earth- we could put the world's entire population into the United States
Walter E. **Williams**, John M. Olin Professor of Economics at George Mason University, Human Events, "Planet Earth possesses abundant room for people", Volume 55, Issue 17, May 7 **1999**, Proquest

Idiots like Erlich and organizations such as Planned Parenthood, the State Department's Agency for International Development and NFPRHA constantly sound nonsense warnings about how overpopulation produces disaster and poverty. There is absolutely no relationship between high populations, disaster and poverty.
Population-control idiots might consider Zaire's meager population density of 39 people per square mile to be ideal while Hong Kong's population density of 247,501 people per square mile is problematic. Hong Kong is 6,000 times more crowded than Zaire. Yet Hong Kong's per capita income is $8,260 while Zaire, the world's poorest country, has a per capita income of less than $200.
Planet Earth is loaded with room. We could put the world's entire population into the United States. Doing so would make our population density 1,531 people per square mile. That's a far lower population density than what now exists in New York (11,440), Los Angeles (9,126) and Houston (7,512). The entire U.S. population could move to Texas and each family of four would enjoy 2.9 acres of land. If the entire world's population moved to Texas, California, Colorado and Alaska, each family of four would enjoy nine-tenths of an acre of land.

Population growth won't use up more land because density will increase faster
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 7

Future population growth. Population forecasts are published with confidence and fanfare. Yet the record of even the official forecasts made by U.S. government agencies and by the UN is little (if any) better than that of the most naive predictions.
For example, experts in the 1930s foresaw the U.S. population declining, perhaps to as little as 100 million people well before the turn of the century. In 1989, the U.S. Census Bureau forecast that U.S. population would peak at 302 million in 2038 and then decline. Just three years later, the Census Bureau forecast 383 million in 2050 with no peaking in sight. The science of demographic forecasting clearly has not yet reached perfection.
Present trends suggest that even though total population for the world is increasing, the density of population on most of the world's surface will de-crease. This is already happening in the developed countries. Although the total populations of developed countries increased from 1950 to 1990, the rate of urbanization was sufficiently great that population density on most of their land areas (say, 97 percent of the land area of the United States) has been decreasing. As the poor countries become richer, they will surely experience the same trends, leaving most of the world's surface progressively less populated, astonishing as this may seem.

A2: We'll Hit Standing Room Only

We will never hit standing room only – it isn't even a consideration at present
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 504-505

Objection 1. But population growth must stop at some point. There is some population size at which the world's resources must run out, some moment at which there will be "standing room only."
When someone questions the need to immediately check population growth in the United States or in the world, the standard response ever since Malthus has been a series of calculations showing how, after population doubles a number of times, there will be standing room only—a solid mass of human bodies on the Earth or in the United States This apparently shows that population growth ought to stop sometime—well before "standing room only," of course. But even if we stipulate that population growth must some-time stop, by what reasoning do people get from "sometime" to "now"? At least two aspects of such reasoning can be identified.
First, the stop-now argument assumes that if humans behave in a certain way now they will inevitably continue to behave the same way in the future. But one need not assume that if people decide to have more children now, their descendants will continue to have them at the same rate indefinitely. By analogy, because you decide to have another beer today, you must automatically drink yourself to death. But if you are like most people, you will stop after you recognize a reasonable limit. Yet many seem to have a "drunkard" model of fertility and society: if you take one drink, you're down the road to hell.
Another line of reasoning that leads people away from the reasonable conclusion that humankind will respond adaptively to population growth derives from the mathematics of exponential growth, the "geometric increase" of Malthus. The usual argument that population will "explode" to a doomsday point is based on the crudest sort of curve fitting, a kind of hypnotism by mathematics. Starkly, the argument is that population will grow exponentially in the future because it has always grown so in the past. This proposition is not even true historically, as we saw in chapter 22; population has remained stationary or gotten smaller in large parts of the world for long periods of time (for example, in Europe after the Roman Empire, and among aborigine tribes in Australia). And many other sorts of trends have been reversed in the past before being forced to stop by physical limits (the length of women's skirts, and the spread of Christianity and Islam).
If you are attracted to the sort of curve fitting that underlies most arguments about the need to control population growth, you might do well to consider other long trends that we have discussed earlier. For example, the proportion of people who die each year from famine from natural causes has surely been decreasing for at least a century since the beginning of mankind, and even the absolute number of people who die of famine has been decreasing despite the large increases in total population (see chapter 5). An even more reliable and important statistical trend is the steady increase in life expectancy over re-corded history. Why not focus on the documented trends rather than on the hypothetical total-population trend?

Extensions: Population Key To Food

COUNTRIES THAT SUFFER FROM FAMINE ARE USUALLY THE LEAST DENSELY POPULATED, AND SUFFER BECAUSE OF CIVIL WARS, AND SMALL POPULATIONS MEANS THEY CAN'T SUPPORT THE INFRASTRUCTURE NECESSARY FOR FOOD TO TRAVEL ACROSS THE COUNTRY
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, **1995** [SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

In arguing their case, the believers in overpopulation make vague, tautological references to a standard known as "carrying capacity" colorfully illustrated with stories about gazelle herds and bacteria (anything but human beings). When the verbiage is cleared away, what are adduced as the symptoms of overpopulation? Famine, deepening poverty, disease, environmental degradation, and resource depletion. Yet on no count does the evidence support the anti-population lobby's case. On the contrary, the long-term trend for each factor is positive and points to an even better future. The television pictures of starving, emaciated Africans are heartbreaking, but they are not evidence of overpopulation. Since 1985 we have witnessed famine in Ethiopia, Sudan, and Somalia. Those nations have one thing in common: they are among the least densely populated areas on earth. Although their populations are growing, the people there are not hungry because the world can't produce enough food. They are hungry because civil war keeps food from getting to them. Moreover, the very sparseness of their populations makes them vulnerable to famine because there are insufficient people to support sophisticated roads and transportation systems that would facilitate the movement of food.
In the 20th century there has been no famine that has not been caused by civil war, irrational economic policies, or political retribution. Not one. Moreover, the number of people affected by famine compared to that in the late 19th century has fallen--not just as a percentage of the world's population but in absolute numbers.

Extensions: Population Key To Food

Malthusian theory on food questions is totally incorrect – food production is rapidly increasing over time driven largely by increasing population
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 105-106

The notion that we are facing a long-run food shortage due to increased population and the Malthusian shortage of land is now scientifically discredited. High-tech methods of producing vastly more food per acre will not be needed for decades or centuries. Only after population multiplies several more times will there be enough incentive to move beyond the present field cropping systems used in the more advanced countries. But beyond the shadow of a doubt, the knowledge now exists to support many times the present world's population on less land than is now being farmed—that is, even without expanding beyond our own planet.
Malthus might be rephrased thusly: Whether or not population grows exponentially, subsistence grows at an even faster exponential rate (largely but not entirely because of population growth). And capacity to improve other aspects of the standard of living, beyond subsistence, grows at a still faster exponential rate, due largely to the growth of knowledge.
The main reason why more food has not been produced in the past is that there was insufficient demand for more food. As demand increases, farmers work harder to produce crops and improve the land, and more research is done to increase productivity. This extra work and investment imposes costs for a while. But as we saw in chapter 5, food has tended in the long run to become cheaper decade after decade. That's why production and consumption per capita have been rising.
Will a "population explosion" reverse these trends? On the contrary. Population growth increases food demand, which in the short run requires more labor and investment to meet the demand. (There is always some lag before supply responds to additional demand, which may mean that some will suffer.) But in the foreseeable long run, additional consumption will not make food more scarce and more expensive. Rather, in the long run additional people actually cause food to be less scarce and less expensive.
Once again, the basic process portrayed in this book, applied to food: More people increase scarcity of food for a while. The higher prices prompt agronomical researchers and farmers to invent. The solutions that are eventually found cause food to be more available than before. (The population theme will be developed in Part Two.)

A2: Population Growth Leads To Starvation

Overopopulation doesn't cause starvation – we could easily feed 9 billion people through high yield farming
Joseph L. **Bast**, President and CEO of the Heartland Institute, Heartland Perspectives, "Ending the Myth of Overpopulation", July 8, **1999,** http://www.heartland.org/Article.cfm?artId=629

What about the often-cited negative effects of population growth? Agricultural economist D. Gale Johnson of the University of Chicago has shown that death by starvation has become more rare as the global population has grown, because food production consistently outpaces population growth. Developing countries more than doubled their food production between 1965 and 1988, for example, and China and India have moved from being net importers of food to net exporters. Today, starvation is typically the result of civil wars and failed government agricultural policies, not overpopulation.
Could the world's farmers feed 9 billion people? Easily, according to agriculture expert Dennis T. Avery of the Hudson Institute. The widespread adoption of high-yield farming methods already being used in developed nations would enable farmers to double their output without increasing the number of acres under cultivation. The same, he says, is true of forestry. In other words, we can feed the world and meet all of its wood fiber needs without reducing the size of parks or wilderness areas.

NO. SIMPLY USING WATER MORE EFFICIENTLY OWULD ALLOW ENOUGH FOOD FOR FORTY BILLION PEOPLE TO PE PRODUCED
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, **1995** [SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

Catastrophists argue that the bright past does not imply a bright future; they arbitrarily assert that mankind has crossed some fateful threshold. But the earth is capable of feeding many more people than are now alive. The late Roger Revelle of Harvard University (whom Gore claims as a mentor) estimated that Africa, Asia, and Latin America alone, simply by using water more efficiently, could feed 35 to 40 billion people--seven to eight times the current world population. And that assumes no change in technology--a groundless assumption, to be sure.

Population growth will not outpace food production – all main arguments are answered.
Bjorn **Lomborg**, associate professor of statistics at university of Aarhus. The skeptical environmentalist; measuring the real state of the world. **2001,** p. 108-109

Lester Brown has worried about food production since the beginning of the 1970s. Countless times he has predicted that now food production would go down and prices up. In 1974 he wrote, "throughout most of the period since World War II, the world food economy has been plagued by chronic excess capacity, surplus stocks, and low food prices. But emerging conditions suggest that this era is ending and is being replaced by a period of more or less constant scarcity and higher prices."753 He made the same statement in 1996, just updating the years: "Clearly, we are entering a new era. An age of relative food abundance is being replaced by one of scarcity."754 But both statements were wrong. By early 2001 wheat was cheaper than ever. The IMF's food price index had dropped to the lowest value ever.
Again, in 1981 Lester Brown wrote that the future growth in yields "may be much less than has been assumed in all official projections of world food supply. The post-war trend of rising yields per hectare has been arrested or reversed in the United States, France, and China."755 All three countries went on to experience annual yield growth rates between 2.3 percent and 5 percent.756
We have here studied the best arguments and data that Lester Brown has been able to put forth to vindicate the argument that population growth would outpace food production. However, they do not seem to carry much weight. Prices are still declining. There is no "wall" for maximum yields in sight. At the same time, a large proportion of the world's peasants can achieve a dramatic improvement in yield simply by approaching the yields that are obtained by the best 20 percent of today's producers. The FAO expects that production will still increase by 1.6 percent annually in teh developing world over the next 15 years.

Population Growth Increases Standard Of Living

STANDARDS OF LIVING INCREASE AS THE MORTALITY RATE DECREASES
Sheldon **Richman, 1993**, Senior Editor at the CATO Institute, "The Population Problem That Isn't", July, http://www.fff.org/freedom/0793c.asp

Moreover, a little investigation reveals that the greatest progress in man's material condition came precisely during the time the growth in his numbers was the greatest. The Industrial Revolution brought not only increasing wealth, but a dramatic lengthening of life expectancy and fall in infant mortality — in other words, an unprecedented growth in population. The population economist Julian Simon likes to point out that graphs illustrating population growth and life expectancy in the West look nearly identical. From 8000 B.C., the line is nearly horizontal. Then at about 200 years ago, it turns up like a rocket. Life expectancy jumped from under 30 years to over 75. The growth in world population is equally dramatic. The population stood at about 5 million in 10,000 B.C. For 99.9 percent of human history, population doubled about every 35,000 years. But beginning in 1650, that doubling time began to shrink. Between then and 1750, it was 240 years. Between 1850 and 1900 it fell to 115 years. In 1970, the doubling time shrank to a mere 35 years, a population growth rate of 2.1 percent a year.
Yet during the acceleration in population growth, industrial society got better and better. Think about how material conditions in the region of the United States have changed in the last 100 years or the last 200 years. In 1492 this resource-rich area was inhabited by many fewer than the 250 million who live there today. Yet the pre-Columbian inhabitants could do no better than eke out a subsistence. The area could barely support a few million people then, but today it easily supports 250 million.
The solution to this apparent paradox lies in the fact that, as Ayn Rand so often reminded us, man's basic tool of survival is reason. Man is a creator. That solution overthrows any notion of a conflict of interest between human beings. Every person, being equipped with a mind, is a potential problem solver and not just a consumer of resources. Thus, we should expect that more people will solve more problems, make more scientific discoveries, invent more things that make life better. That is exactly what happens.

MORE PEOPLE LEAVE US BETTER OFF THAN WE WERE BEFORE THEY WERE BORN
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, 1995 [SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

Nothing written here implies that population growth does not bring problems. Quite the contrary; but as Julian Simon says, it also brings problem solvers who apply their intelligence, discover and invent solutions, and--here is the key--leave human society better off than it was before the problems arose. Doubters need only study the quality of life on the pre-Columbian North American continent, when several million Indians barely scratched out their subsistence amid the same "natural resources" that today enrich the lives of billions of people worldwide.

EMPIRICALLY, POPULATION GROWTH IMPROVES LIFE; PROVEN BY ITALY, CHINA, AND INDIA
Cesare **Bonivento**, Bishop, Population Research Institute Review, "Does More Population Mean More Poverty in a Nation?" January/February **2005,** http://www.pop.org/main.cfm?id=266&r1=1.00&r2=3.00&r3=93.00&r4=1.00&level=4&eid=781 Does More Population Mean More Poverty in a Nation?

First of all we have to mention some basic and historical facts, which disprove the statement *more population means more poverty.* Firstly we have the examples of many countries, which are much better off now with big populations, than when they were fewer in number. For instance:
In India in 1964, there were 500 million people and a great famine. Now in 2005, with more than one billion people, India is self-sufficient for food.
In 1922, Italy had a population of 27 million people and was one of the nations with a great migration out of the country for lack of food and jobs. In 2005 with a population of 57 million, it is in need of more population in order to keep up with the pace of its development. The same applies to the whole of Western Europe.
China in 1950, at the time of the Communist revolution, had a population of more or less 600 million people and was heavily underdeveloped. Now with a population of 1.3 billion, China is a superpower.

Uniqueness: Human Well-Being High

We control uniqueness – all indicators of well-being and resource availability are positive
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 587-588

As Beisner puts it, we can forecast with certainty that humanity will be higher in the future than now; we cannot forecast with any confidence whether at any given future time humanity will be more or less evil than now 6 It may be that for at least some time—until the evolution of our knowledge and our society, together with our imaginations, put us onto a new track—the developed world will suffer from a shortage of challenges to bring out the best in people. It may be that, just as additional people are the ultimate resource to resolve human problems, the absence of satisfying challenges may be the ultimate shortage.
I do not say that everything now is fine, of course. Children are still hungry and sick; some people live out lives of physical and intellectual poverty, and lack of opportunity; war or some new pollution may do us all in. What I am saying is that for most of the relevant economic matters I have checked, the trends are positive rather than negative. And I doubt that it does the troubled people of the world any good to say that things are getting worse though they are really getting better. And false prophecies of doom can damage us in many ways.
Is a rosy future guaranteed? Of course not. There always will be temporary shortages and resource problems where there are strife, political blundering, and natural calamities—that is, where there are people. But the natural world allows, and the developed world promotes through the marketplace, responses to human needs and shortages in such manner that one backward step leads to 1.0001 steps forward, o hereabouts. That's enough to keep us headed in a life-sustaining direction.

A2: Population Growth ➔ Disease/Hurts Health

Historical experience shows rising population is consistent with increasing health
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 460

More generally, the historical picture in the West during the past half millennium, and in most countries in the world during the past few decades, has shown concurrent growth in all three key factors—population density, income, and life expectancy. This suggests that increased density and increased income—either individually or in combination—benefit people's life expectancy and health, as well as visa versa.

Modern disease prevention means rising population density has no impact on health
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 460-461

Why is health better where there is higher population density? Let's make a negative point first. There is nowadays no reason why population density should worsen health now that the important infectious environmental diseases, excepting malaria, have been conquered. And malaria—which many medical historians consider to have been the most important of mankind's diseases—flourishes where population is sparse and where large tracts of moist land are therefore left uncultivated. In these areas increased population density removes the mosquitoes' breeding grounds.

Extensions: More People Means More Resources

PEOPLE CONSTANTLY FIND NEW WAYS TO UTILIZE RESOURCES; MORE PEOPLE MEANS MORE RESOURCES – WE DON'T DEPLETE
RICHMAN, SENIOR EDITOR OF CATO INSTITUTE, **1995** [SHELDON, TESTIMONY of Sheldon Richman Senior Editor, Cato Institute The International Population Stabilization and Reproductive Health Act (S. 1029) July 20,, http://cato.org/testimony/ct-ps720.html]

Actually, natural resources do not exist at all. All resources are manmade. Something is not a resource until it can accomplish a human purpose. Before Benjamin Silliman, Jr., a Yale University chemist, discovered in 1855 that kerosene (a better illuminant than whale oil) could be distilled from crude oil, oil was not a resource. It was black gunk that ruined farmland and had to be removed at great expense. Silliman turned oil into a resource not by changing its chemical composition but by making a discovery. Nature does not provide resources, only materials. A resource is a material that has been stamped with a human purpose.

The latest evidence of that truth is the information revolution that swirls around us. That revolution is made possible by silicon computer chips and threads of glass (fiber-optic cables). Both are made from sand--one of the most abundant substances on the planet. Thanks to human ingenuity, a common substance that was merely part of the landscape has become a tool of revolutionary human advancement. People don't deplete resources. They create them.

TURN; TIMES OF HIGH POPULATION GROWTH SPUR HIGHWER RESOURCE PRODUCTION
KRAUTKRAEMER 2005
[JEFFREY, PROFESSOR AT UNIVERSITY OF HAWAII, ECONOMICS OF NATURAL RESOURCE SCARCITY: THE STATE OF THE DEBATE, APRIL, RESOURCES FOR THE FUTURE, www.rff.org/Documents/RFF-DP-05-14.pdf]

Data from the United States for the period 1870–1958 for agriculture, minerals, forestry, and commercial fishing are examined. During this period, population increased by a factor of four, annual output increased 20 times, and the output of the extractive industries increased about six times. This period of rapid population and economic growth should furnish a good test of the relative impacts of diminishing marginal returns and technological progress.

Agricultural output increased four times over this period, and the unit cost declined by one-half when both capital and labor are included and by one-third when only labor is included. The cost measure for agricultural production actually declines more rapidly after 1920. The economy became more mineral intensive over this period, with mineral resource use increasing 40 times. Even so, the unit extraction cost measure for minerals production declined significantly with an increase in the rate of decline after 1920. Commercial fishing also saw a decrease in extractive cost. Only forestry unit extraction cost increased, although both output and unit cost tended to level out after 1920. The conclusion is that the data do not support the strong scarcity hypothesis of increasing resource scarcity (Barnett and Morse 1963).

MALTHUS IS HISTORICALLY WRONG – POPULATION GROWTH REDUCES SCARCITY AND SOLVES POVERTY
SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFIED **2005**
[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

Now we need some theory to explain how it can be that economic welfare grows along with population, rather than humanity being reduced to misery and poverty as population grows.

The Malthusian theory of increasing scarcity, based on supposedly-fixed resources - the theory that the doomsayers rely upon - runs exactly contrary to the data over the long sweep of history. Therefore it makes sense to prefer another theory.

The theory that fits the facts very well is this: More people, and increased income, cause problems in the short run. Short-run scarcity raises prices. This presents opportunity, and prompts the search for solutions. In a free society, solutions are eventually found. And in the long run the new developments leave us better off than if the problems had not arisen.

Extensions: More People Means More Resources

RESOUCRES BECOME MORE PLENTIFUL AS THE POPULATION INCREASES
SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFED **2005**
[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

But if the resources with which people work are not fixed over the period being analyzed, then the Malthusian logic of diminishing returns does not apply. And the plain fact is that, given some time to adjust to shortages, the resource base does not remain fixed. People create more resources of all kinds. When we take a long-run view, the picture is different, and considerably more complex, than the simple short-run view of more people implying lower average income. In the very long run, more people almost surely imply more available resources and a higher income for everyone.

Malthusian theory is flawed – population growth increases wealth, quality of life and creates solutions to any temporary scarcity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 12

To sum up the argument of the book: In the short run, all resources are limited. An example of such a finite resource is the amount of attention that you will devote to what I write. The longer run, however, is a different story. The standard of living has risen along with the size of the world's population since the beginning of recorded time. There is no convincing economic reason why these trends toward a better life should not continue indefinitely.
Many people find it difficult to accept this economic argument. Dwindling resources, increasing pollution, starvation and misery—all this seems inevitable unless we curb population growth or otherwise cut back consumption of natural resources. Thomas Malthus reached this conclusion nearly two centuries ago in his famous Essay on the Principle of Population, and popular thinking is now dominated by his gloomy theory (not widely accepted in Malthus" own day).
The new theory that is the key idea of the book—and is consistent with current evidence—is this: Greater consumption due to an increase in population and growth of income heightens scarcity and induces price run-ups. A higher price represents an opportunity that leads inventors and business-people to seek new ways to satisfy the shortages. Some fail, at cost to them-selves. A few succeed, and the final result is that we end up better off than if the original shortage problems had never arisen. That is, we need our problems, though this does not imply that we should purposely create additional problems for ourselves.
The most important benefit of population size and growth is the increase it brings to the stock of useful knowledge. Minds matter economically as much as, or more than, hands or mouths. Progress is limited largely by the availability of trained workers.

Human history disproves scarcity theory as we would all die of people used more than they create
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 383

'The strongest reasons for believing that solutions leave us better off than if the scarcity problems had never arisen is the record of humanity over the millennia becoming both more wealthy in the power to control our environment and make it yield the goods that we want, and our consequent increase in numbers. This implies that, on average, the people in each generation create a bit more than they use up. Not only must this be so for there to have been an increase in our wealth and numbers, but if this were not so—if we used up a bit more than we create, and our assets deteriorated like a many-times-patched tire deteriorates until it is no longer useful, we simply would have become extinct as a species. The essential condition of fitness for survival for our species is that we do create a net surplus each generation on average (or at least break even), and since we have survived and increased, this condition must have been present.

Extensions: More People Means More Resources

Population increases won't create long-term resource scarcity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 401-402

Similarly, you may well ask about the near-term effect of population growth on resources, after all this talk about the long run. There is more comfort for you than for Zeke, however. True, within a very short time there is little chance for the natural-resource supply to accommodate a sudden increase in demand. But population growth is a very slow-acting phenomenon, not changing radically in any short period. And it is not until many years after the birth of a child that the additional person uses much natural resources. For both these reasons, modern industry has plenty of time to respond to changes in actual demand, and we need not fear short-run price run-ups due to increased population growth. This analysis jibes with the continued long-run decrease in the prices of all raw materials, as discussed in chapters 1-3.

Population leads to adoption of old technology and the creation of new which diminishes resource pressures
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 376

Population growth spurs the adoption of existing technology as well as the invention of new technology. This has been well documented in agriculture24 where people turn to successively more "advanced" but more laborious methods of getting food as population density increases—methods that were previously known but not used because they were not needed earlier. This scheme well describes the passage from hunting and gathering—which we now know requires extraordinarily few hours of work a week to provide a full diet—to migratory slash-and-burn agriculture, and thence to settled long-fallow agriculture, to short-fallow agriculture, and eventually to the use of fertilizer, irrigation, and multiple cropping. Though each stage initially requires more labor than the previous one, the endpoint is a more efficient and productive system that requires much less labor, as we see in chapters 6 and 28. This sequence throws light on why the advance of civilization is not a "race" between technology and population advancing independently of each other. Contrary to the Malthusian view, there is no immediate necessary linkage between all food-increasing inventions and increased production of food. Some inventions—the "invention-pull" type, such as a better calendar—may be adopted as soon as they are proven successful, because they will increase production with no more labor (or will enable less labor to produce the same amount of food). But other inventions—the "population-push" type, such as settled agriculture or irrigated multicropping—at first require more labor, and hence will not be adopted until demand from additional population warrants the adoption.25 The Malthusian invention-pull innovation is indeed in a sort of race between population and technology. But the adoption of the population-push inventions is not in a race at all; rather, it is the sort of process discussed at length in chapters 1–3 on natural resources.26 The Malthusian view of the dynamic relationship between population growth and the supply of food, and the view urged here, are shown in figures 26-2a and 26-2b.

Extensions: More People Means More Resources

Long term effects of population growth are nearly all positive as human ingenuity creates solution to any short-term scarcity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 579

Many of the trends reported here are in fact commonplace among the scientists who study them. The consensus of agricultural economists has consistently been an optimistic point of view about food supply, and the consensus of natural resource economists has never been gloomy. But the scientific consensus with respect to population growth largely changed in the 1980s. The consensus of population economists is now not far from what is written in this book; the profession and I agree that in the first few decades the effect of population growth is neutral. Such institutions as the World Bank and the National Academy of Sciences have recanted their former views that population growth is a crucial obstacle to economic development. (I am still in the minority when I emphasize the long-run benefits, on balance, of more people.)
The central issue is the effects of the number of people upon the standard of living, with special attention to raw materials and the environment. On balance the long-run effects are positive. The mechanism works as follows: Population growth and increase of income expand demand, forcing up prices of natural resources. The increased prices trigger the search for new supplies. Eventually new sources and substitutes are found. These new discoveries leave humanity better off than if the shortages had not occurred.
The vision which underlies and unifies the various topics is that of human beings who create more than they destroy. But even talented and energetic people require an incentive to create better techniques and organizations, and protection for the property that is the fruit of their labors. Therefore, the political-economic structure is the crucial determinant of the speed with which economic development occurs. In the presence of economic liberty and respect for property, population growth causes fewer problems in the short run, and greater benefits in the short run, than where the state controls economic activity.

Extensions: Population Growth Key To Technology

Assuming equality studies over time and within countries prove more population means more knowledge and productivity
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 378-379

On the "supply side" there is also much misunderstanding, especially the belief that the number of potential inventors does not matter. One source of this misunderstanding for some is the idea that, to paraphrase, "One need only contrast innovation and creativity in tiny Athens in the Golden Age with monstrous Calcutta" now, or Calcutta with Budapest of the 1930s, to see that more people do not imply more technical knowledge being produced. This argument leaves out the all-things-equal clause; Calcutta is poor. And, underlying this argument is the implied (but unwarranted) assumption that Calcutta is poor because it has so many people.
If we make more appropriate comparisons—comparing Greece to itself and Rome to itself during periods with different population sizes and growth rates, or comparing industries of various sizes in different countries now—we find that a larger population is associated with more knowledge and productivity, because there are more potential inventors and adopters of new technology. I plotted the numbers of great discoveries, as recorded by historians of science who have made such lists, against population size in various centuries. Figure 26–3 shows that population growth or size, or both, were associated with an increase in scientific activity, and population decline with a decrease. (Of course other factors come to bear, too, and I am exploring the matter in more detail for the whole history of Europe.)29

All the evidence supports the hypothesis that technology is a function of population
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 598

The second issue in Campbell's list is the endogeneity of growth with respect to human numbers. The first-mentioned critic (H. W. Arndt) says: "The notion that technological progress is a function of population because the larger the population the larger the number of inventive minds strains credulity." In my view, the notion that increase in knowledge is not a function of the number of people seems to strain credulity; after all, where does knowledge come from except from human minds? But credulity is not the test; the conclusion should depend not on what one or another person finds credible, but rather evidence should be the test.
Neither Arndt nor anyone else brings evidence to bear against the proposition, while in this book and my other books (see especially Simon 1992), much evidence is presented in the book in support of the proposition that there is a strong connection between population and production of knowledge, holding income level constant.

A2: Population Growth Kills Energy Reserves

Population increases won't change underlying trends towards cheap and plentiful future energy
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 403

The prevalence of this unsound thinking demands that we inquire into the effects of population upon the supply of energy. We want to know: What will be the effect of more or fewer people upon the future scarcity and prices of energy?
This much we can say with some certainty: (1) With respect to the short-run future—within say thirty years—this year's population growth rate can have almost no effect on the demand for energy or on its supply. (2) In the intermediate run, energy demand is likely to be proportional to population, all else equal; hence additional people require additional energy. (3) For the longer run, whether additional population will increase scarcity, reduce scar-city, or have no effect on scarcity is theoretically indeterminate. The outcome will depend on the net effect of increased demand on the current supplies of energy as of a given moment, together with increases in potential supplies through discoveries and technological advances that will be induced by the increase in demand. In the past, increased demand for energy has been associated with reduced scarcity and cost. There is no statistical reason to doubt the continuation of this trend. More particularly, there seems to be no reason to believe that we are now at a turning point in energy history, and no such turning point is visible in the future. This implies a trend toward lower energy prices and increased supplies.

A2: Erlich

EHRLICH'S PREDICTIONS WERE P0WNZORED BY SIMON; HE WAS DEAD WRONG IN HIS DOOMSAYING ASSUMPTIONS
THE ECONOMIST 1997
[PLENTY OF GLOOM, http://mscserver.cox.miami.edu/msc491/Readings/PlentyofGloom.htm, DECEMBER 18]

Dr Ehrlich would later claim that he was "goaded into making a bet with Simon on a matter of marginal environmental importance." At the time, though, he said he was keen to "accept Simon's astonishing offer before other greedy people jump in." Dr Ehrlich chose five minerals: tungsten, nickel, copper, chrome and tin. They agreed how much of these metals $1,000 would buy in 1980, then ten years later recalculated how much that amount of metal would cost (still in 1980 dollars) and Dr Ehrlich agreed to pay the difference if the price fell, Dr Simon if the price rose. Dr Simon won easily; indeed, he would have won even if they had not adjusted the prices for inflation, and he would have won if Dr Ehrlich had chosen virtually any mineral: of 35 minerals, 33 fell in price during the 1980s. Only manganese and zinc were exceptions (see chart 1).

A2: Population Growth ➔ War

Population growth empirically has no relation to war – all the best studies prove
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 467-468

Ware between and within nations is perhaps the most grisly outcome that population density or growth is said to threaten. Expanding on the chapter's headnote, the common view is as follows: "At the present rate of world population increase, overpopulation may become the major cause of social and political instability. Indeed, the closer man approaches the limits of ultimate density or 'carrying capacity,' the more probable is nuclear warfare.34 This popular view is espoused by the U.S. State Department, AID and CIA, and has been the justification for population control programs abroad. The simple fact, how-ever, is that there is zero evidence connecting population density with the propensity to engage in war, or even fist fights.
A booklength cross-national statistically intensive multivariable study by Douglas A. Hibbs, Jr., found that "other factors held constant, the rate of population growth does not influence magnitudes of mass political violence within nations."35 And in a study of six measures of political instability in Latin America between 1968 and 1977, Alfred G. Cuhsan found "no reason to believe that either population growth or density is a cause of political in¬stability."36
Nazli Choucri concluded that what she calls "demographic" factors some-times lead to conflict.37 But the key demographic factor in her analysis is the relative rate of increase in ethnic groups, rather than increase in population size or population density per se. This can be seen most clearly by listing the wars that she considers "archetypical cases" of "population dynamics and local conflict": the Algerian War of Independence, 1954–1962; the Nigerian civil war; the two wars involving Indonesia; the conflicts in Ceylon and El Salvador–Honduras; and the Arab-Israeli series of wars. None of these seem, to my layman's eye, to be conflicts undertaken to obtain more land or mineral re-sources so as to increase the standard of living of the group initiating the conflict. To show that population growth causes conflict, one would need to show that two neighboring countries or groups, both of whom are growing rapidly, are more likely to come into conflict than two neighboring countries or groups neither of whom are growing rapidly. This Choucri has not shown. In Choucri's way of looking at the matter, conflict could as easily be caused by one country or group reducing its growth rate relative to another country or group, as by one increasing its relative growth rate. And in fact many have argued that it was just so in the case of France and Germany—that France's low birthrate induced the French-German wars.

A2: Overshoot

There is zero evidence of overshoot risk
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 9

The doomsters reply that because there are more of us, we are eroding the basis of existence, and rendering more likely a "crash" due to population "overshoot"; that is, they say that our present or greater numbers are not sustainable. But the signs of incipient catastrophe are absent. Length of life and health are increasing, supplies of food and other natural resources are becoming ever more abundant, and pollutants in our environment are decreasing.
In reply, the doomsters point to vaguer signs of environmental disruption. I must confess that I see none of the signs that they point to except those that have nothing to with the "carrying capacity" of the Earth – I do see profound changes in society and civilization, most of which can be interpreted as either good or bad, and which are entirely within our own control . But you the reader will decide for yourself whether those claims of the doomsters are convincing to you in light of the issues that we can discuss objectively and that are taken up in the book.

A2: Unsustinability/Population Growth Is A Ponzi Scheme

Population growth isn't a Ponzi scheme because scarcity will increase prices leading to more consumption and a better environment for future generations due to consumption now
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 404-405

But population growth does not constitute a Ponzi scheme: there is no reason to expect resources to run out. Instead, as Part One of this book demonstrates (on the basis of the history of long-run price declines in all natural resources, plus theory that fits the data), resources may be expected to become more available rather than more scarce. Hence there is no reason to think that consumption in the present is at the expense of future consumers, or that more consumers now imply less for consumers in the future. Rather, it is reasonable to expect that more consumption now implies more resources in the future because of induced discoveries of new ways to supply resources, which eventually leave resources cheaper and more available than if there were less pressure on resources in the present.
There is a second important difference between a Ponzi scheme and this book's view of population and resources. As the Ponzi scheme begins to peter out, the price of franchises falls as sellers find it more difficult to induce more buyers to purchase, and the system begins to fall apart. But if a resource be-comes in shorter supply in any period, price rises in a fashion that reduces usage (and presumably reduces population growth), and hence it constitutes a self-adjusting rather than a self-destructing system.
Of course this view of population and resources runs against all "common sense"—that is, against conventional belief. But science is only interesting when it gives us knowledge that is not arrived at by common sense alone.

A2: Invisible Threshold/Potential

Your catastrophic potential arguments are logically irrefutable fallacies and contradict historical evidence
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 435-436

It might make sense to control population growth if the issue were simply the increased risk of catastrophe due to population growth, and if only the number of deaths mattered, rather than the number of healthy lives lived. A flaw in this line of reasoning is revealed, however, by pushing it to its absurd endpoint: One may reduce the risk of pollution catastrophe to zero by reducing to zero the number of persons who are alive. And this policy obviously is unacceptable to all except a few. Therefore we must dig deeper to learn how pollution ought to influence our views about population size and growth.
The argument that population growth is a bad thing because it may bring about new and possibly catastrophic forms of pollution is a special case of a more general argument: Avoid any change because it may bring about some devastating destruction by a power as yet unknown. There is an irrefutable logic in this argument. In its own terms, adding a few not-too-unreasonable assumptions, it cannot be proven wrong, as follows: Assume that any alteration in industrial technique may have some unexpected ill effects. Assume also that the system is acceptably safe right now. Additional people increase the need for change, and this makes a prima facie case against population growth. And the same argument can be applied to economic growth: Economic growth brings about change, which can bring dangers. (See comments by Ehrlich and Lovins in chapter 13.) Hence economic growth is to be avoided.
Of course, this sit-tight, leave-well-enough-alone posture is possible for us 1990s humans only because economic and population growth in the past produced the changes that brought many of us to the "well enough" state that might now be "left alone."' That is, the high life expectancy and high living standard of middle-class people in developed countries could not have come about if people in the past had not produced the changes that got the most fortunate of us here—and if they had not suffered from some changes in doing so. We now are living off our inheritance from past generations the way some children live off the inheritance of parents who worked hard and saved.
There is nothing logically wrong with living off an inheritance without in turn increasing the heritage of knowledge and high living standards that will be left to subsequent generations. But you should at least be clear that this is what you are doing if you opt for "zero growth"—if zero growth really were possible. (In fact, upon close examination, the concept of zero economic growth, unlike zero population growth, turns out to be either so vague as to be undefinable, or just plain nonsense. Furthermore, a no-growth policy provides benefits to the well-off that are withheld from the poor.)8
Proponents of zero growth argue that future generations will benefit from fewer changes now. That cannot be ruled out logically. But the historical evidence quite clearly runs the other way: If our ancestors had, at any time in the past, opted for zero population growth or for a frozen economic system, we would certainly be less well-off than we now are. Hence it seems reasonable to project the same trend into the future. Most specifically, a larger economic capability and a larger population of knowledge creators has put into our hands a wider variety of more powerful tools for preventing and controlling threats to our lives and environment—especially communicable diseases and hunger—than society could have bequeathed to us if its size had been frozen at any time in the past.

A2: Consensus Is Population Bad

Your consensus arguments are falsified propaganda
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 525-526

Antinatalists convey the impression that all the experts agree that population is growing too fast in the United States and that it is simply a fact that population is growing too fast. An example from Lester Brown: "There are few if any informed people who any longer deny the need to stabilize world population."
Other examples come from Paul Ehrlich, "Everyone agrees that at least half of the people of the world are undernourished (have too little food) or malnourished (have serious imbalances in their diet)." And, "I have yet to meet anyone familiar with the situation who thinks India will be self-sufficient in food by 1971, if ever." And from a Newsweek columnist and former high State Department official: "Informed men in every nation now know that, next to population growth and avoidance of nuclear war, the despoiling of nature is the biggest world problem of the next 30 years."'
These "everyone agrees" statements are just plain wrong. Many eminent experts did not agree with them when they were made (and now the consensus disagrees with them, as discussed in chapter 34). But such assertions that "everyone agrees" may well be effective in manipulating public opinion. Which nonspecialist is ready to pit his or her own opinion against that of all the "informed people"?

Consensus is with Simon – even if population isn't *per se* good most agree it is not inherently bad
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 13-14

The biggest news is that the consensus of population economists now also is not far from the views expressed in this book. In 1986, the National Research Council and the National Academy of Sciences published a monograph on population growth and economic development prepared by a prestigious scholarly group. This "official" report reversed almost completely the frightening conclusions of the previous 1971 NAS report. "The scarcity of exhaustible resources is at most a minor constraint on economic growth," it said. It found that additional people bring benefits as well as costs. Even the World Bank, for many years a major institutional purveyor of gloom-and-doom notions about population growth, reported in 1984 that the world's natural resource situation provides no reason to limit population growth.
A host of review articles by distinguished economic demographers since the mid-1980s have confirmed that this "revisionist" view (a label I am not fond of) is indeed consistent with the scientific evidence, even if only some population economists go as far as I do in emphasizing the positive long-run effects of population growth. The consensus is more toward a "neutral" judgment: population growth neither helps nor hinders economic growth. But this is a huge change from the earlier consensus that population growth is detrimental. By now, anyone who asserts that population growth damages the economy must turn a blind eye to both the scientific evidence and the relevant scientific community.

Extensions: Default To Our Evidence/Doom Predictions Suspect

ENVIRONMENTAL DESTRUCTION IS THE ULTIMATE CONSTRUCTED THREAT
THE ECONOMIST 1997
[PLENTY OF GLOOM, http://mscserver.cox.miami.edu/msc491/Readings/PlentyofGloom.htm, DECEMBER 18]

Environmentalists are quick to accuse their opponents in business of having vested interests. But their own incomes, their advancement, their fame and their very existence can depend on supporting the most alarming versions of every environmental scare. "The whole aim of practical politics", said H.L. Mencken, "is to keep the populace alarmed—and hence clamorous to be led to safety—by menacing it with an endless series of hobgoblins, all of them imaginary." Mencken's forecast, at least, appears to have been correct.

Doomsday population forecasting is inherently suspect
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 330

With a track record this poor, one wonder why official agencies should make any such forecasts at all, especially when they are based on little more than guesses concerning such matters as future immigration policy and people's decisions about how many children to have. We have no experience to rely on for estimating how people will act under the conditions that will prevail in the future.
In short, this history of population forecasts should make us think twice – or thrice – before crediting doomsday forecasts of population growth.

Your forecasts are flawed because bases are wildly inaccurate
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 331

Not only are methods of population forecasting unreliable, but the base of data used for many countries, and the world as a whole, is still shockingly weak. In 1992, it was reveled that the populations of several developing countries were much lower than anyone had imagined they could be. Nigeria's population, for example, was said by standard sources to be 122.5 million in 1991. But when the results of the 1991 Census were released – quite likely the best census ever done, by far – the total turned out to be 88.5 million people. Amazing.

Doomsters underestimate future scientific discoveries that will bring technology with population
Simon in '96
Julian Simon, Former Professor of Business Administration at the University of Maryland and Former Senior Fellow at the CATO Institute, "The Ultimate Resource 2", 1996, p. 367

IT IS YOUR MIND that matters economically, as much as or more than your mouth or hands. The most important economic effect of population size and growth is the contribution of additional people to our stock of useful knowledge. And this contribution is great enough in the long run to overcome all the costs of population growth. This is a strong statement, but the evidence for it seems very strong.
Many who deprecate the potential contribution of knowledge of additional people, and who would halt population growth, also make little allowance for mind-boggling discoveries yet to be made. They assume that what we now believe is impossible will always be so. Even great scientists (Ernest Rutherford and Albert Einstein in the epigraphs to chapter 13, for example) frequently underestimate the possibilities for useful discoveries, especially in fields they themselves work on. (See chapter 2 for a discussion of experts' tendencies to discount new knowledge.)

Rights Malthus Turns (Liberty Solves Scarcity/Over-Population)

Liberty solves the harms of overpopulation- poverty and human rights abuses
Walter E**. Williams**, John M. Olin Professor of Economics at George Mason University, Human Events, "Planet Earth possesses abundant room for people", Volume 55, Issue 17, May 7 **1999**, Proquest

So-called overpopulation problems are really a result of socialistic government practices that reduce the capacity of people to educate, clothe, house and feed themselves. Poor countries are rife with agricultural restrictions, export and import controls, restrictive licensing and price controls, not to mention gross human-rights abuses that encourage their most productive people to emigrate. The most promising anti-poverty tool for poor people and poor countries is personal liberty.

Ophuls and Boyan are wrong—the government needs to adopt a laissez-faire attitude to generate growth and avoid the crunch
Zey in 2000
(Michael - Ph.D in sociology, executive director of the Expansionary Institute – "The Future Factor," p. 255)

<Government can facilitate humankind's pursuit of its destiny by becoming a champion of technological, economic, and intellectual growth. Government should strive to remove restrictions on the sciences and other institutions as they labor to expand human potential and enhance species' growth. In addition, national and international governing organizations can adopt a laissez-faire attitude toward science's efforts to help humans become a healthier and more intellectually adroit species.>

ECONOMIC FREEDOM IS KEY TO INGINUITY WHICH SOLVES POPULATION AND SCARCITY ISSUES
Sheldon **Richman, 1993**, Senior Editor at the CATO Institute, "The Population Problem That Isn't", July, http://www.fff.org/freedom/0793c.asp

<There is one caveat to this analysis: human ingenuity can overcome the apparent obstacles to prosperity only if people are free to create, produce, and trade unimpeded by government or criminals. For this to occur, there must be a rule of law that protects property and profits and that permits the price system of the free market to operate. The price system is particularly relevant, because it is the communications system that indicates to entrepreneurs what people want and how best to procure it. Without the free market, the principles outlined above are suspended and so are man's hopes for progress.
The poverty of the so-called Third World is not an exception to the principles discussed here, but rather confirmation of them. Where human ingenuity is not allowed to operate, it doesn't. The poverty of Russia, India, China, Somalia, and Brazil is the result of cultures and governments that do not let people act capitalistically. We know this because in recently poor areas where people are free to so act, they thrive: Hong Kong, Singapore, Taiwan, South Korea. (These are not perfect free markets, but they are substantially market-oriented.) They have experienced rapid economic growth-along with population growth-while their neighbors, with lower population densities and more abundant raw materials, remain destitute. What the poor countries have is not overpopulation but overgovernance.>

LACK OF INDIVIDUAL LIBERTY IS THE CAUSE OF THE WORLDS POPULATION PROBLEM
SIMON, PROFESSOR OF BUSINESS ADMINISTRATION AT UNIVERSITY OF MARYLAND, LAST MODIFIED **2005**
[MORE PEOPLE, GREATER WEALTH, MORE RESOURCES, HEALTHIER ENVIRONMENT, http://www.juliansimon.com/writings/Articles/POPENVI2.txt]

The world's problem is not too many people, but lack of political and economic freedom. Powerful evidence comes from an extraordinary natural experiment that occurred starting in the 1940s with three pairs of countries that have the same culture and history, and had much the same standard of living when they split apart after World War II -- East and West Germany, North and South Korea, Taiwan and China. In each case the centrally planned communist country began with less population "pressure", as measured by density per square kilometer, than did the market- directed economy. And the communist and non-communist countries also started with much the same birth rates.
The market-directed economies have performed much better economically than the centrally-planned economies. The economic-political system clearly was the dominant force in the results of the three comparisons. This powerful explanation of economic development cuts the ground from under population growth as a likely explanation of the speed of nations' economic development.

Spark Frontline

The possibility of nuclear extinction outweighs all other impacts-even if the risk of extinction is small, its magnitude requires evaluation before all else

Schell, 1982

(Jonathan, professor at Wesleyan University, former writer and editor at the New Yorker, “The Fate of the Earth,” pg. 93-94)

<To say that human extinction is a certainty would, of course, be a misrepresentation—just as it would be a misrepresentation to say that extinction can be ruled out. To begin with, we know that a holocaust may not occur at all. If one does occur, the adversaries may not use all their weapons. If they do use all their weapons, the global effects, in the ozone and elsewhere, may be moderate. And if the effects are not moderate but extreme, the ecosphere may prove resilient enough to withstand them without breaking down catastrophically. These are all substantial reasons for supposing that mankind will not be extinguished in a nuclear holocaust, or even that extinction in a holocaust is unlikely, and they tend to calm our fear and to reduce our sense of urgency. Yet at the same time we are compelled to admit that there may be a holocaust, that the adversaries may use all their weapons, that the global effects, including effects of which we are as yet unaware, may be severe, that the ecosphere may suffer catastrophic breakdown, and that our species may be extinguished. We are left with uncertainty, and are forced to make our decisions in a state of uncertainty. If we wish to act to save our species, we have to muster our resolve in spite of our awareness that the life of the species may not now in fact be jeopardized. On the other hand, if we wish to ignore the peril, we have to admit that we do so in the knowledge that the species may be in danger of imminent self-destruction. When the existence of nuclear weapons was made known, thoughtful people everywhere in the world realized that if the great powers entered into a nuclear-arms race the human species would sooner or later face the possibility of extinction. They also realized that in the absence of international agreements preventing it an arms race would probably occur. They knew that the path of nuclear armament was a dead end for mankind. The discovery of the energy in mass—of "the basic power of the universe"—and of a means by which man could release that energy altered the relationship between man and the source of his life, the earth. In the shadow of this power, the earth became small and the life of the human species doubtful. In that sense, the question of human extinction has been on the political agenda of the world ever since the first nuclear weapon was detonated, and there was no need for the world to build up its present tremendous arsenals before starting to worry about it. At just what point the species crossed, or will have crossed, the boundary between merely having the technical knowledge to destroy itself and actually having the arsenals at hand, ready to be used at any second, is not precisely knowable. But it is clear that at present, with some twenty thousand megatons of nuclear explosive power in existence, and with more being added every day, we have entered into the zone of uncertainty, which is to say the zone of risk of extinction. But the mere risk of extinction has a significance that is categorically different from, and immeasurably greater than, that of any other risk, and as we make our decisions we have to take that significance into account. Up to now, every risk has been contained within the frame of life; extinction would shatter the frame. It represents not the defeat of some purpose but an abyss in which all human purposes would be drowned for all time. We have no right to place the possibility of this limitless, eternal defeat on the same footing as risks that we run in the ordinary conduct of our affairs in our particular transient moment of human history. To employ a mathematical analogy, we can say that although the risk of extinction may be fractional, the stake is, humanly speaking, infinite, and a fraction of infinity is still infinity. In other words, once we learn that a holocaust might lead to extinction we have no right to gamble, because if we lose, the game will be over, and neither we nor anyone else will ever get another chance. Therefore, although, scientifically speaking, there is all the difference in the world between the mere possibility that a holocaust will bring about extinction and the certainty of it, morally they are the same, and we have no choice but to address the issue of nuclear weapons as though we knew for a certainty that their use would put an end to our species. In weighing the fate of the earth and, with it, our own fate, we stand before a mystery, and in tampering with the earth we tamper with a mystery. We are in deep ignorance. Our ignorance should dispose us to wonder, our wonder should make us humble, our humility should inspire us to reverence and caution, and our reverence and caution should lead us to act without delay to withdraw the threat we now pose to the earth and to ourselves.

In trying to describe possible consequences of a nuclear holocaust, I have mentioned the limitless complexity of its effects on human society and on the ecosphere—a complexity that sometimes seems to be as great as that of life itself. But if these effects should lead to human extinction, then all the complexity will give way to the utmost simplicity—the simplicity of nothingness. We—the human race—shall cease to be.>

Spark Frontline

Nuclear war blocks out sunlight, causing earth temperatures to drop at least 20°C by turning off the greenhouse effect
Sagan and Turco, 1990

(Carl and Richard, astrophysicist and astronomer at Cornell University, and founding director of UCLA's Institute of the Environment, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race," pg 23-4)

<In a nuclear war, powerful nuclear explosions at the ground would propel fine particles high into the stratosphere. Much of the dust would be carried up by the fireball itself. Some would be sucked up the stem of the mushroom cloud. Even much more modest explosions on or above cities would produce massive fires, as occurred in Hiroshima and Nagasaki. These fires consume wood, petroleum, plastics, roofing tar, natural gas, and a wide variety of other combustibles. The resulting smoke is far more dangerous to the climate than is the dust. Two kinds of smoke are generated. Smoldering combustion is a low-temperature flameless burning in which fine, oily, bluish-white organic particles are produced. Cigarette smoke is an example. By contrast, in flaming combustion—when there's an adequate supply of oxygen—the burning organic material is converted in significant part to elemental carbon, and the sooty smoke is very dark. Soot is one of the blackest materials nature is able to manufacture. As in an oil refinery fire, or a burning pile of auto tires. or a conflagration in a modern skyscraper—more generally in any big city fire—great clouds of roiling, ugly, dark, sootv smoke would rise high above the cities in a nuclear war, and 'spread first in longitude, then in latitude.
The high-altitude dust particles reflect additional sunlight back to space and cool the Earth a little. More important are the dense palls of black smoke high in the atmosphere; they block the sunlight from reaching the lower atmosphere, where the greenhouse gases mainly reside. These gases are thereby deprived of their leverage on the global climate. The greenhouse effect is turned down and the Earth's surface is cooled much more.
Because cities and petroleum repositories are so rich in combustible materials, it doesn't require very many nuclear explosions over them to make so much smoke as to obscure the entire Northern Hemisphere and more. If the dark, sooty clouds are nearly opaque and cover an extensive area, then the greenhouse effect can be almost entirely turned off. In the more likely case that some sunlight trickles through, the temperatures nevertheless may drop 10 or 20°C or more, depending on season and geographical locale. In many places, it may at midday get as dark as it used to be on a moonlit night before the nuclear war began. The resulting environmental changes may last for months or years.
If the greenhouse effect is a blanket in which we wrap ourselves to keep warm, nuclear winter kicks the blanket off. This darkening and cooling of the Earth following nuclear war— along with other ancillary consequences—is what we mean by nuclear winter. (A more detailed discussion of the global climate and how nuclear winter works is given in Appendix A.)>

Even a 10 Celsius change in average Earth temperature risks extinction
Sagan and Turco, 1990

(Carl and Richard, astrophysicist and astronomer at Cornell University, and founding director of UCLA's Institute of the Environment, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race," pg 22)

<Life on Earth is exquisitely dependent on the climate (see Appendix A). The average surface temperature of the Earth— averaged, that is, over day and night, over the seasons, over latitude, over land and ocean, over coastline and continental interior, over mountain range and desert—is about 13°C, 13 Centigrade degrees above the temperature at which fresh water freezes. (The corresponding temperature on the Fahrenheit scale is 55°F.) It's harder to change the temperature of the oceans than of the continents, which is why ocean temperatures are much more steadfast over the diurnal and seasonal cycles than are the temperatures in the middle of large continents. Any global temperature change implies much larger local temperature changes, if you don't live near the ocean. A prolonged global temperature drop of a few degrees C would be a disaster for agriculture; by 10°C, whole ecosystems would be imperiled; and by 20°C, almost all life on Earth would be at risk.* The margin of safety is thin.>

Human extinction likely – even if people survive mass inbreeding wipes them out
Bochkov in '84

(Academician, Member of the Medical Academy of Sciences and Director of the Institute of Genetics at the USSR Academy of Sciences, "The Cold and the Dark: The World After Nuclear War", p. 141-142)

Academician Bochkov: When we talk about the ecological and biological consequences of a nuclear war, we are of course focusing on humankind. Thus, in thinking about the possibilities of human survival after a nuclear catastrophe, we should not be afraid to reach the conclusion that the conditions that would prevail would not allow the survival of human beings as a species. We should proceed from the assumption that man has adapted to his environment during a long evolutionary process and has paid the price of natural selection. Only over the past few thousand years has he adapted his environment to his needs and has created, so to speak, an artificial environment to provide food, shelter, and other necessities. Without this, modem man cannot survive. Compared to the dramatic improvements made in the technological environment, biological nature has not changed in the recent past. In the statements of Dr. Ehrlich and Academician Bayev, we have heard about the many constraints there would be on the possibility of man's survival after a nuclear catastrophe. Because we also have to look at the more long-range future, I would like to point out that most long-term effects of a nuclear war will be genetic. If islands of humanity—or as Dr. Ehrlich has said, groups of people on islands somewhere in the ocean—should survive, what will they face in terms of genetic consequences? If the population drops sharply, the question then arises of the critical numbers of a population that would be necessary to ensure its reproduction. On the one hand there will be minimum numbers of human beings; on the other hand, because of the small numbers, there will be isolation. There will definitely be inbreeding, and lethal mutations will come to the fore as a result of this, because of fetal and neonatal exposure to radiation and because of exposure to fallout. New mutations will arise and genes and chromosomes will be damaged as a result of the radiation, so there will be an additional genetic load to bear. There will be natural aberrations and death at birth, so that the burden of hereditary illnesses will be only part of a large load. This undoubtedly will be conducive to the elimination of humanity, because humankind will not be able to reproduce itself as a species.

Spark Frontline

Nuclear war would produce aerosol spikes – crushes phytoplankton causing extinction
Crutzen and Birks in '83

(Paul, Director of the Air Chemistry Division of the Max Planck Institute for Chemistry, and John, Associate Professor of Chemistry and Fellow of the Cooperative Institute for Research in Environmental Sciences, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p.84)

If the production of aerosol by fires is large enough to cause reductions in the penetration of sunlight to ground level by a factor of a hundred, which would be quite possible in the event of an all-out nuclear war, most of the phytoplankton and herbivorous zooplankton in more than half of the Northern Hemisphere oceans would die (36). This effect is due to the fast consumption rate of phytoplankton by zooplankton in the oceans. The effects of a darkening of such a magnitude have been discussed recently in connection with the probable occurrence of such an event as a result of the impact of a large extraterrestrial body with the earth (37). This event is believed by many to have caused the widespread and massive extinctions which took place at the Cretacious-Tertiary boundary about 65 million years ago.

Phytoplankton depletion collapses the carbon cycle causing extinction
Bryant in '03

(Donald, Professor of Biochemistry and Molecular Biology at Penn State, Proceedings of the National Academy of Sciences, "The beauty in small things revealed", Volume 100, Number 17, August 19, http://www.pnas.org/cgi/content/full/100/17/9647)

Oxygenic photosynthesis accounts for nearly all the primary biochemical production of organic matter on Earth. The byproduct of this process, oxygen, facilitated the evolution of complex eukaryotes and supports their/our continuing existence. Because macroscopic plants are responsible for most terrestrial photosynthesis, it is relatively easy to appreciate the importance of photosynthesis on land when one views the lush green diversity of grasslands or forests. However, Earth is the "blue planet," and oceans cover nearly 75% of its surface. All life on Earth equally depends on the photosynthesis that occurs in Earth's oceans.
A rich diversity of marine phytoplankton, found in the upper 100 m of oceans, accounts only for 1% of the total photosynthetic biomass, but this virtually invisible forest accounts for nearly 50% of the net primary productivity of the biosphere (1). Moreover, the importance of these organisms in the biological pump, which traps CO2 from the atmosphere and stores it in the deep sea, is increasingly recognized as a major component of the global geochemical carbon cycle (2). It seems obvious that it is as important to understand marine photosynthesis as terrestrial photosynthesis, but the contribution of marine photosynthesis to the global carbon cycle was grossly underestimated until recently. Satellite-based remote sensing (e.g., NASA sea-wide field sensor) has allowed more reliable determinations of oceanic photosynthetic productivity to be made (refs. 1 and 2; see Fig. 1).

Nuclear war causes massive ozone depletion
Sagan and Turco in '90

(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, and Richard, Professor of Atmospheric Sciences at UCLA, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race", p. 57)

But in a nuclear war, the atmosphere would be so perturbed that our normal way of thinking about the ozone layer needs to be modified. To help refocus our understanding, several research groups have constructed models that describe the ozone layer following nuclear war. The principal work has been carried out by research teams at the National Center for Atmospheric Research and at the Los Alamos National Laboratory (ref. 4.9). Both find that there is an additional mechanism by which nuclear war threatens the ozone layer. With massive quantities of smoke injected into the lower atmosphere by the fires of nuclear war, nuclear winter would grip not only the Earth's surface, but the high ozone layer as well. The severely disturbed wind currents caused by solar heating of smoke would, in a matter of weeks, sweep most of the ozone layer from the northern midlatitudes deep into the Southern Hemisphere. The reduction in the ozone layer content in the North could reach a devastating 50% or more during this phase. As time progressed, the ozone depletion would be made still worse by several effects: injection of large quantities of nitrogen oxides and chlorine-bearing molecules along with the smoke clouds; heating of the ozone layer caused by intermingling of hot smoky air (as air is heated, the amount of ozone declines); and decomposition of ozone directly on smoke particles (carbon particles are sometimes used down here near the ground to cleanse air of ozone).

Ozone depletion causes extinction
Greenpeace in '95

("Full of Homes: The Montreal Protocol and the Continuing Destruction of the Ozone Layer, http://archive.greenpeace.org/ozone/holes/holebg.html)

When chemists Sherwood Rowland and Mario Molina first postulated a link between chlorofluorocarbons and ozone layer depletion in 1974, the news was greeted with scepticism, but taken seriously nonetheless. The vast majority of credible scientists have since confirmed this hypothesis.
The ozone layer around the Earth shields us all from harmful ultraviolet radiation from the sun. Without the ozone layer, life on earth would not exist. Exposure to increased levels of ultraviolet radiation can cause cataracts, skin cancer, and immune system suppression in humans as well as innumerable effects on other living systems. This is why Rowland's and Molina's theory was taken so seriously, so quickly - the stakes are literally the continuation of life on earth.

didn't think we had cards on that did you?

Spark Frontline

Nuclear war leads to a nuclear winter, killing all plant and animal life.
SGR 2003
(Scientists for Global Responsibility, Newsletter, “Does anybody remember the Nuclear Winter?” July 27, http://www.sgr.org.uk/climate/NuclearWinter_NL27.htm)

<Obviously, when a nuclear bomb hits a target, it causes a massive amount of devastation, with the heat, blast and radiation killing tens or hundreds of thousands of people instantly and causing huge damage to infrastructure. But in addition to this, a nuclear explosion throws up massive amounts of dust and smoke. For example, a large nuclear bomb bursting at ground level would throw up about a million tonnes of dust.
As a consequence of a nuclear war, then, the dust and the smoke produced would block out a large fraction of the sunlight and the sun's heat from the earth's surface, so it would quickly become be dark and cold - temperatures would drop by something in the region of 10-20ºC - many places would feel like they were in an arctic winter. It would take months for the sunlight to get back to near normal. The drop in light and temperature would quickly kill crops and other plant and animal life while humans, already suffering from the direct effects of the war, would be vulnerable to malnutrition and disease on a massive scale.
In the case of an (e.g.) accidental nuclear exchange between the USA and Russia, the main effects would be felt in the northern hemisphere, as the dust and smoke would quickly circulate across this area. But even in this case, it would soon affect the tropics - where crops and other plant/animal life are especially sensitive to cold. Hence, even in these areas there would be major problems.>

Nuclear war destroys the ecosystem and biodiversity though destruction of plant resources
Ehrlich et al, 1983
(Paul R. Ehrlich, Stanford University; Mark A. Harwell, Cornell University; Carl Sagan, Cornell University; Anne H. Ehrlich, Stanford University; Stephen J. Gould, Harvard University; biologists on the Long-Term Worldwide Biological Consequences of Nuclear War (Cambridge, Massachusetts, 25 and 26 April 1983)., Science, New Series, Vol. 22, No. 4630, Dec. 23, 1983, pg 1293-1300, jstor)

<The 2 billion to 3 billion survivors of the immediate effects of the war would be forced to turn to natural ecosystems as organized agriculture failed. Just at the time when these natural ecosystems would be asked to support a human population well beyond their carrying capacities, the normal functioning of the ecosystems themselves would be severely curtailed by the effects of nuclear war. Subjecting these ecosystems to low temperature, fire, radiation, storm, and other physical stresses (many occurring simultaneously) would result in their increased vulnerability to disease and pest outbreaks, which might be prolonged. Primary productivity would be dramatically reduced at the prevailing low light levels; and, because of UV-B, smog, insects, radiation, and other damage to plants, it is unlikely that it would recover quickly to normal levels, even after light and temperature values had recovered. At the same time that their plant foods were being limited severely, most, if not all, of the vertebrates not killed outright by blast and ionizing radiation would either freeze or face a dark world where they would starve or die of thirst because surface waters would be frozen and thus unavailable. Many of the survivors would be widely scattered and often sick, leading to the slightly delayed extinction of many additional species.
Natural ecosystems provide civilization with a variety of crucial services in addition to food and shelter. These include regulation of atmospheric composition, moderation of climate and weather, regulation of the hydrologic cycle, generation and preservation of soils, degradation of wastes, and recycling of nutrients. From the human perspective, among the most important roles of ecosystems are their direct role in providing food and their maintenance of a vast library of species from which Homo sapiens has already drawn the basis of civilization (27). Accelerated loss of these genetic resources through extinction would be one of the most serious potential consequences of nuclear war.
Wildfires would be an important effect in north temperate ecosystems, their scale and distribution depending on such factors as the nuclear war scenario and the season. Another major uncertainty is the extent of fire storms, which might heat the lower levels of the soil enough to damage or destroy seed banks, especially in vegetation types not adapted to periodic fires. Multiple airbursts over seasonally dry areas such as California in the late summer or early fall could burn off much of the state's forest and brush areas, leading to catastrophic flooding and erosion during the next rainy season. Silting, toxic runoff, and rainout of radio-nuclides could kill much of the fauna of fresh and coastal waters, and concentrated radioactivity levels in surviving filter-feeding shellfish populations could make them dangerous to consume for long periods of time.
Other major consequences for terrestrial ecosystems resulting from nuclear war would include: (i) slower detoxification of air and water as a secondary result of damage to plants that now are important metabolic sinks for toxins; (ii) reduced evapotranspiration by plants contributing to a lower rate of entry of water into the atmosphere, especially over continental regions, and therefore a more sluggish hydrologic cycle; and (iii) great disturbance of the soil surface, leading to accelerated erosion and, probably, major dust storms (28).
Revegetation might superficially resemble that which follows local fires. Stresses from radiation, smog, erosion, fugitive dust, and toxic rains, however, would be superimposed on those of cold and darkness, thus delaying and modifying postwar succession in ways that would retard the restoration of ecosystem services (29). It is likely that most ecosystem changes would be short term. Some structural and functional changes, however, could be longer term, and perhaps irreversible, as ecosystems undergo qualitative changes to alternative stable states (30). Soil losses from erosion would be serious in areas experiencing widespread fires, plant death, and extremes of climate. Much would depend on the wind and precipitation patterns that would develop during the first postwar year (4, 5). The diversity of many natural communities would almost certainly be substantially reduced, and numerous species of plants, animals, and microorganisms would become extinct.>

Spark Frontline

Environmental collapse causes extinction
Diner – Judge Advocate General's Corps-**1994**
[Major David N., United States Army Military Law Review Winter, p. lexis]

By causing widespread extinctions, humans have artificially simplified many ecosystems. As biologic simplicity increases, so does the risk of ecosystem failure. The spreading Sahara Desert in Africa, and the dustbowl conditions of the 1930s in the United States are relatively mild examples of what might be expected if this trend continues. Theoretically, each new animal or plant extinction, with all its dimly perceived and intertwined affects, could cause total ecosystem collapse and human extinction. Each new extinction increases the risk of disaster. Like a mechanic removing, one by one, the rivets from an aircraft's wings, n80 mankind may be edging closer to the abyss.

Nuclear war collapses global infrastructure and causes mass disease pandemics
Sagan, Former Professor of Astronomy at Harvard University, **1985**, (Carl, "The Nuclear Winter," http://www.cooperativeindividualism.org/sagan_nuclear_winter.html)

In addition, the amount of radioactive fallout is much more than expected. Many previous calculations simply ignored the intermediate time-scale fallout. That is, calculations were made for the prompt fallout -- the plumes of radioactive debris blown downwind from each target-and for the long-term fallout, the fine radioactive particles lofted into the stratosphere that would descend about a year later, after most of the radioactivity had decayed. However, the radioactivity carried into the upper atmosphere (but not as high as the stratosphere) seems to have been largely forgotten. We found for the baseline case that roughly 30 percent of the land at northern midlatitudes could receive a radioactive dose greater than 250 rads, and that about 50 percent of northern midlatitudes could receive a dose greater than 100 rads. A 100-rad dose is the equivalent of about 1000 medical X-rays. A 400-rad dose will, more likely than not, kill you.
The cold, the dark and the intense radioactivity, together lasting for months, represent a severe assault on our civilization and our species. Civil and sanitary services would be wiped out. Medical facilities, drugs, the most rudimentary means for relieving the vast human suffering, would be unavailable. Any but the most elaborate shelters would be useless, quite apart from the question of what good it might be to emerge a few months later. Synthetics burned in the destruction of the cities would produce a wide variety of toxic gases, including carbon monoxide, cyanides, dioxins and furans. After the dust and soot settled out, the solar ultraviolet flux would be much larger than its present value. Immunity to disease would decline. Epidemics and pandemics would be rampant, especially after the billion or so unburied bodies began to thaw. Moreover, the combined influence of these severe and simultaneous stresses on life are likely to produce even more adverse consequences -- biologists call them synergisms -- that we are not yet wise enough to foresee.

DISEASE CAUSES EXTINCTION.
Daswani, 96 (Kavita, South China Morning Post, 1/4, lexis)

Despite the importance of the discovery of the "facilitating" cell, it is not what Dr Ben-Abraham wants to talk about. There is a much more pressing medical crisis at hand - one he believes the world must be alerted to: the possibility of a virus deadlier than HIV. If this makes Dr Ben-Abraham sound like a prophet of doom, then he makes no apology for it. AIDS, the Ebola outbreak which killed more than 100 people in Africa last year, the flu epidemic that has now affected 200,000 in the former Soviet Union - they are all, according to Dr Ben-Abraham, the "tip of the iceberg". Two decades of intensive study and research in the field of virology have convinced him of one thing: in place of natural and man-made disasters or nuclear warfare, humanity could face extinction because of a single virus, deadlier than HIV. "An airborne virus is a lively, complex and dangerous organism," he said. "It can come from a rare animal or from anywhere and can mutate constantly. If there is no cure, it affects one person and then there is a chain reaction and it is unstoppable. It is a tragedy waiting to happen." That may sound like a far-fetched plot for a Hollywood film, but Dr Ben -Abraham said history has already proven his theory. Fifteen years ago, few could have predicted the impact of AIDS on the world. Ebola has had sporadic outbreaks over the past 20 years and the only way the deadly virus - which turns internal organs into liquid - could be contained was because it was killed before it had a chance to spread. Imagine, he says, if it was closer to home: an outbreak of that scale in London, New York or Hong Kong. It could happen anytime in the next 20 years - theoretically, it could happen tomorrow. The shock of the AIDS epidemic has prompted virus experts to admit "that something new is indeed happening and that the threat of a deadly viral outbreak is imminent", said Joshua Lederberg of the Rockefeller University in New York, at a recent conference. He added that the problem was "very serious and is getting worse". Dr Ben-Abraham said: "Nature isn't benign. The survival of the human species is not a preordained evolutionary programme. Abundant sources of genetic variation exist for viruses to learn how to mutate and evade the immune system." He cites the 1968 Hong Kong flu outbreak as an example of how viruses have outsmarted human intelligence. And as new "mega-cities" are being developed in the Third World and rainforests are destroyed, disease-carrying animals and insects are forced into areas of human habitation. "This raises the very real possibility that lethal, mysterious viruses would, for the first time, infect humanity at a large scale and imperil the survival of the human race," he said.

Spark Frontline

Nuclear war destroys ocean ecosystems
Harte in '84

(John, Professor of Energy and Resources at UC Berkeley, "The Cold and the Dark: The World After Nuclear War", p. 112-113)

The effect of a period of prolonged darkness on aquatic organisms has been estimated by experimentation in my laboratory and by mathematical modeling carried out by Drs. Chris McKay and Dave Milne. Both types of research produced similar results. Food chains composed of phytoplankton, zooplankton, and fish are likely to suffer greatly from light extinction. After just a few days of darkness, phytoplankton—the base of the food chain—would die off or go into a dormant stage. Within roughly two months in the temperate zone in late spring or summer, and within three to six months in that zone in winter, aquatic animals would show drastic population declines that for many species could be irreversible. These estimates (based on light reduction) probably underestimate the consequences for marine life of post–nuclear-war conditions because they take no account of thermal effects, and they do not include the effect of increased water turbidity arising from shoreline erosion and from soot and dust deposition. The sensitivity of marine life in the tropics to prolonged darkness is likely to be greater than that of marine life in the temperate zone because nutrient reserves are lower and metabolic requirements are greater in the tropics. In the polar regions, where adaptation to dark winters is a requirement for life, the sensitivity would be lessened. Freshwater lakes would become highly anoxic after the dust settles and the temperatures increase. Massive amounts of organic wastes, including thawing corpses, would render water supplies lethal. There is little reason to believe that the major forms of aquatic life that presently serve as food sources for us would survive a nuclear war occurring in spring or summer in sufficient numbers to be of much use to human beings, at least in the first few postwar years.

All life on earth is dependent upon the oceans-if it dies we die
National **O**ceanic and **A**tmospheric **A**dministration, **1998** (Year of the Ocean Report, http://www.yoto98.noaa.gov/yoto/meeting/mar_env_316.html)

<The ocean plays a critical role in sustaining the life of this planet. Every activity, whether natural or anthropogenic, has far reaching impacts on the world at large. For example, excessive emissions of greenhouse gases may contribute to an increase the sea level, and cause potential flooding or an increase in storm frequency; this flooding can reduce wetland acreage and increase sediment and nutrient flows into the Gulf of Mexico, causing adverse impacts on water quality and reducing habitat for commercial fisheries. This in turn drives up the cost of fish at local markets nationwide.
The environment and the economic health of marine and coastal waters are linked at the individual, community, state, regional, national and international levels. The interdependence of the economy and the environment are widely recognized. The United States has moved beyond viewing health, safety, and pollution control as additional costs of doing business to an understanding of broader stewardship, recognizing that economic and social prosperity would be useless if the coastal and marine environments are compromised or destroyed in the process of development (President's Council on Sustainable Development, 1996).
Much about the ocean, its processes, and the interrelationship between land and sea is unknown. Many harvested marine resources depend upon a healthy marine environment to exist. Continued research is needed so that sound management decisions can be made when conflicts among users of ocean resources arise. Although much progress has been made over the past 30 years to enhance marine environmental quality and ocean resources, much work remains. The challenge is to maintain and continue to improve marine water quality as more people move to the coasts and the pressures of urbanization increase. Through education, partnerships, technological advances, research, and personal responsibility, marine environmental quality should continue to improve, sustaining resources for generations to come.
"It does not matter where on Earth you live, everyone is utterly dependent on the existence of that lovely, living saltwater soup. There's plenty of water in the universe without life, but nowhere is there life without water. The living ocean drives planetary chemistry, governs climate and weather, and otherwise provides the cornerstone of the life-support system for all creatures on our planet, from deep-sea starfish to desert sagebrush. That's why the ocean matters. If the sea is sick, we'll feel it. If it dies, we die. Our future and the state of the oceans are one."

Extensions: Shouldn't Risk Nuclear Extinction

ANY USE of nuclear weapons is suicide – small deviations can cause extinction – we shouldn't risk it
Velikhov in '84

(Academician, Vice-President of the USSR Academy of Sciences and Director of the Kurchatov Nuclear Physics Institute and Foreign Member of the Royal Swedish Academy of Sciences, "The Cold and the Dark: The World After Nuclear War", p. 151-152)

As for myself, I think that one of the important conclusions of our Conference is that even the use of a small portion of the nuclear arsenals would bring about catastrophic results, not just by the immediate deaths of multitudes of innocent people, but also because it would lead to drastic changes in environment and in climate, which can bring about infinitely negative results. Generally speaking, humanity exists even today in a very unstable ecological system, so that any deviations from it will threaten his continued existence. Therefore, all kinds of policy positions on local or so-called "limited" war, counterforce strikes, "controlled" war, flexible reaction, or prolonged war are concepts that have become, in the light of what we now know, totally baseless. They all bring about those catastrophic and horrible results that we have just seen. We see that no military or psychological arguments—and there are many of them—can refute these results. I think the only conclusion possible is that our nuclear devices are not and cannot be used as weapons of war or tools of war; nor can they be a tool of politics. They are simply tools of suicide. I should say that the analysis that has been made today is not based on the worst possible case because we have not taken into account some factors that could be involved in a nuclear conflict. For example, we have not included the immense stores of toxic wastes and have not calculated the impact of their being targeted. We have not factored in the results of targeting nuclear power plants. This could certainly intensify all of these results, particularly in the long term. The conclusion is that even nuclear superiority is an illusion because at this point we have accumulated such an enormous amount of nuclear weapons. Now we know that nuclear arms are not muscles of the modern state. They are instead a cancerous growth which threatens the very life of the planet. Just as the cancer patient does not have a good chance of living a long and happy life, neither does humanity have a chance to continue to coexist with the bomb forever. Either we destroy the cancerous growth or the cancerous growth will destroy us.

Extensions: Nuclear War ➔ Extinction (General)

Nuclear winter would lower temperatures, devastate agriculture and cause extinction in a few generations
Philips, 2000
(Alan, Dr. with Physicians for Global Survival, “NUCLEAR WINTER REVISITED”, October, http://www.peace.ca/nuclearwinterrevisited.htm)

< Deaths from world-wide starvation after the war would be several times the number from direct effects of the bombs, and the surviving fraction of the human race might then diminish and vanish after a few generations of hunger and disease, in a radioactive environment.
The concept of Nuclear Winter
Bombs directed at missile silos would burst at ground level and throw a huge amount of dust into the atmosphere, as the explosion of a volcano does. It is as much as a million tonnes from a large nuclear bomb bursting at ground level.
Bombs bursting over cities and surface installations, like factories or oil stores and refineries, would cause huge fires and fire-storms that would send huge amounts of smoke into the air.
The 1980's research showed that the dust and the smoke would block out a large fraction of the sunlight and the sun's heat from the earth's surface, so it would be dark and cold like an arctic winter. It would take months for the sunlight to get back to near normal.
The cloud of dust and smoke would circle the northern hemisphere quickly. Soon it could affect the tropics, and cold would bring absolute disaster for all crops there. Quite likely it would cross the equator and affect the southern hemisphere to a smaller degree.
While the temperature at the surface would be low, the temperature of the upper part of the troposphere (5-11 km) would rise because of sunlight absorbed by the smoke, so there would be an absolutely massive temperature inversion. That would keep many other products of combustion down at the levels people breathe, making a smog such as has never been seen before. PYROTOXINS is a word coined for all the noxious vapours that would be formed by combustion of the plastics, rubber, petroleum, and other products of civilization. It is certain that these poisons would be formed, but we do not have quantitative estimates. The amount of combustible material is enormous, and it would produce dioxins, furans, PCB's, cyanides, sulphuric and sulphurous acids, oxides of nitrogen, carbon monoxide and carbon dioxide in amounts that would make current concerns about atmospheric pollution seem utterly trivial. There would also be toxic chemicals like ammonia and chlorine from damaged storage tanks.>

Nuclear winter causes mass extinction including humanity
Philips, 2000
(Alan, Dr. with Physicians for Global Survival, “NUCLEAR WINTER REVISITED”, October, http://www.peace.ca/nuclearwinterrevisited.htm)

< Altogether, nuclear winter would be an ecological disaster of the same sort of magnitude as the major extinctions of species that have occurred in the past, the most famous one being 65 million years ago at the cretaceous extinction. Of all the species living at the time, about half became extinct. The theory is that a large meteor made a great crater in the Gulf of California, putting a trillion tons of rock debris into the atmosphere. That is a thousand times as much rock as is predicted for a nuclear war, but the soot from fires blocks sunlight more effectively than rock debris. In nuclear winter there would also be radioactive contamination giving worldwide background radiation doses many times larger than has ever happened during the 3 billion years of evolution. The radiation would notably worsen things for existing species, though it might, by increasing mutations, allow quicker evolution of new species (perhaps mainly insects and grasses) that could tolerate the post-war conditions. (I should just mention that there is no way the radioactivity from a nuclear war could destroy "all life on earth". People must stop saying that. There will be plenty of evolution after a war, but it may not include us.)>

Extensions: Nuclear War Could Cause Extinction

Though extinction from the direct effects of nuclear war is unlikely, extinction in the long term is a possibility
Ehrlich et al, 1983
(Paul R. Ehrlich, Stanford University; Mark A. Harwell, Cornell University; Carl Sagan, Cornell University; Anne H. Ehrlich, Stanford University; Stephen J. Gould, Harvard University; biologists on the Long-Term Worldwide Biological Consequences of Nuclear War (Cambridge, Massachusetts, 25 and 26 April 1983)., Science, New Series, Vol. 22, No. 4630, Dec. 23, 1983, pg 1293-1300, jstor)

<The possibility exists that the darkened skies and low temperatures would spread over the entire planet (4, 5). Should this occur, a severe extinction event could ensue, leaving a highly modified and biologically depauperate Earth. Species extinction could be expected for most tropical plants and animals, and for most terrestrial vertebrates of north temperate regions, a large number of plants, and numerous freshwater and some marine organisms. It seems unlikely, however, that even in these circumstances Homo sapiens would be forced to extinction immediately. Whether any people would be able to persist for long in the face of highly modified biological communities; novel climates; high levels of radiation; shattered agricultural, social, and economic systems; extraordinary psychological stresses; and a host of other difficulties is open to question. It is clear that the ecosystem effects alone resulting from a large-scale thermonuclear war could be enough to destroy the current civilization in at least the Northern Hemisphere. Coupled with the direct casualties of over 1 billion people, the combined intermediate and long-term effects of nuclear war suggest that eventually there might be no human survivors in the Northern Hemisphere. Furthermore, the scenario described here is by no means the most severe that could be imagined with present world nuclear arsenals and those contemplated for the near future (4, 5). In any large-scale nuclear exchange between the superpowers, global environmental changes sufficient to cause the extinction of a major fraction of the plant and animal species on the Earth are likely. In that event, the possibility of the extinction of Homo sapiens cannot be excluded.>

Nuclear war will cause mass extinction through species extinction, starvation, and radioactive fallout
Sagan, Former Professor of Astronomy at Harvard University, **1985**, (Carl, "The Nuclear Winter," http://www.cooperativeindividualism.org/sagan_nuclear_winter.html)

Our results have been carefully scrutinized by more than 100 scientists in the United States, Europe and the Soviet Union. There are still arguments on points of detail. But the overall conclusion seems to be agreed upon: There are severe and previously unanticipated global consequences of nuclear war-subfreezing temperatures in a twilit radioactive gloom lasting for months or longer.
Scientists initially underestimated the effects of fallout, were amazed that nuclear explosions in space disabled distant satellites, had no idea that the fireballs from high-yield thermonuclear explosions could deplete the ozone layer and missed altogether the possible climatic effects of nuclear dust and smoke. What else have we overlooked? Nuclear war is a problem that can be treated only theoretically. It is not amenable to experimentation. Conceivably, we have left something important out of our analysis, and the effects are more modest than we calculate. On the other hand, it is also possible-and, from previous experience, even likely-that there are further adverse effects that no one has yet been wise enough to recognize. With billions of lives at stake, where does conservatism lie-in assuming that the results will be better than we calculate, or worse?
Many biologists, considering the nuclear winter that these calculations describe, believe they carry somber implications for life on Earth. Many species of plants and animals would become extinct. Vast numbers of surviving humans would starve to death. The delicate ecological relations that bind together organisms on Earth in a fabric of mutual dependency would be torn, perhaps irreparably. There is little question that our global civilization would be destroyed. The human population would be reduced to prehistoric levels, or less. Life for any survivors would be extremely hard. And there seems to be a real possibility of the extinction of the human species. It is now almost 40 years since the invention of nuclear weapons. We have not yet experienced a global thermonuclear war -- although on more than one occasion we have come tremulously close. I do not think our luck can hold forever. Men and machines are fallible, as recent events remind us. Fools and madmen do exist, and sometimes rise to power. Concentrating always on the near future, we have ignored the long-term consequences of our actions. We have placed our civilization and our species in jeopardy.

Nuclear war leads to human extinction through ecological collapse, nuclear fallout, and the extinction of ocean species
Schell, 1982 (Jonathan, professor at Wesleyan University, former writer and editor at the New Yorker, "The Fate of the Earth," pg. 93-94)

<The view of the earth as a single system, or organism, has only recently proceeded from poetic metaphor to actual scientific investigation, and on the whole Dr. Thomas's observation that "we do not really understand nature, at all" still holds. It is as much on the basis of this ignorance, whose scope we are only now in a position to grasp, as on the basis of the particular items of knowledge in our possession that I believe that the following judgment can be made: Bearing in mind that the possible consequences of the detonations of thousands of megatons of nuclear explosives include the blinding of insects, birds, and beasts all over the world; the extinction of many ocean species, among them some at the base of the food chain; the temporary or permanent alteration of the climate of the globe, with the outside chance of "dramatic" and "major" alterations in the structure of the atmosphere; the pollution of the whole ecosphere with oxides of nitrogen; the incapacitation in ten minutes of unprotected people who go out into the sunlight; the blinding of people who go out into the sunlight; a significant decrease in photosynthesis in plants around the world; the scalding and killing of many crops; the increase in rates of cancer and mutation around the world, but especially in the targeted zones, and the attendant risk of global epidemics; the possible poisoning of all vertebrates by sharply increased levels of Vitamin D in their skin as a result of increased ultraviolet light; and the outright slaughter on all targeted continents of most human beings and other living things by the initial nuclear radiation, the fireballs, the thermal pulses, the blast waves, the mass fires, and the fallout from the explosions; and, considering that these consequences will all interact with one another in unguessable ways and, furthermore, are in all likelihood an incomplete list, which will be added to as our knowledge of the earth increases, one must conclude that a full-scale nuclear holocaust could lead to the extinction of mankind.>

Extensions: Nuclear War Could Cause Extinction

Human extinction as a consequence of nuclear war is a possibility that most be considered-extinction is not impossible

Sagan and Turco, 1990 (Carl and Richard, astrophysicist and astronomer at Cornell University, and founding director of UCLA's Institute of the Environment, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race," pg 71-4)

<Still, it is not too much to ask that our leaders do not pose a treat to the human species. People of many different political persuasions believe they see a vast difference between killing, nine-tenths of the human species and killing everybody, course there is. If there are survivors, there is some chance the regeneration of the human population. Extinction means that there will be no more humans forever. We confess to having difficulty understanding why the prospect of killing everybody would bring about more protest against government policies than the prospect of killing almost everybody; nevertheless, that increased protest (and public scrutiny) is what some analysts feared from nuclear winter and has been, we believe, behind some of the media and political fixation on nuclear extinction (ref. 5.5).

People concentrate themselves in large cities, so killing them there has become easy in the nuclear age (ref. 5.6). But people also live in towns and in the countryside. This is why killing a quarter of the population of a nation through the direct (or "prompt") effects of nuclear weapons is much easier than killing, say, half or three-quarters. That's where nuclear winter comes in. Nuclear winter is a way for nuclear weapons to find and kill those who live far from cities.

Certainly, the casualty estimates from prompt effects in a nuclear war are appalling: The U.S. nuclear war protocol (Sin-elf Integrated Operational Plan, SIOP) of I960 vintage would have destroyed every city in the Soviet Union and China, with estimated direct fatalities around 400 million (ref. 5.7). Presidential Review Memorandum 10 (February 18, 1977) estimated some 250 million fatalities in a U.S./U.S.S.R. central exchange ref. 5.8). Since then, estimates of the dangers of radioactive fallout have had to be revised—to take account of the tenfold underestimate of intermediate timescale fallout radiation doses in official publications, and the consequences of attacks on militarv and commercial nuclear fuel facilities; global casualties from radioactivity alone are now estimated at 80 to 290 million refs. 5.9, 5.10), with the higher numbers, in our opinion, more likely. Thus, several hundred million prompt fatalities may occur in a full-scale nuclear exchange, with up to a billion more fatalities if urban centers and nuclear fuel facilities worldwide are heavily targeted (ref. 5.11); separate, longer-term fatalities —especially from nuclear winter-related crop failures and resulting malnutrition and starvation—might amount to several billion (ref. 3.11). Many others would die from the collapse of the society (the unavailability of physicians, hospitals, and medicines, for example), the spread of disease, and (later) the increased ultraviolet radiation. Under these, perhaps pessimistic, estimates, the sum of prompt and long-term fatalities approaches the total human population of over 5 billion. A key issue, addressed below, is survival in the midlatitudes of the Southern Hemisphere.

With the technological base in ruins, and accessible key resources depleted, recovery of the global civilization after nuclear war is in doubt. There would also be, in the words of Andrei Sakharov, "the rise of a savage and uncontrollable hatred of scientists and 'intellectuals' . . . , rampant superstition, ferocious nationalism, and the destruction of the material and informational basis of civilization"; it would introduce a new "age of barbarism" (ref. 5.12).

Destruction of the global civilization is very different, though, from extinction of the human species. However, the multiple stresses on biological systems, and likely interactions (synergisms) among these stresses, could fundamentally alter ecological relationships on which humans now depend. Considering a nuclear winter scenario at the severe end of the spectrum of possibilities, a distinguished group of ecologists and biologists argue that massive species extinctions—especially but not exclusively at tropical and subtropical latitudes where there are few adaptations to cold—would ensue (ref. 5.f3).>

It seems unlikely, however, that even in these circumstances Homo .sapiens would be forced to extinction immediately. Whether any people would be able to persist for long in the face of highly modified biological communities; novel climates; high levels of radiation; shattered agricultural, social, and economic systems; extraordinary psychological stresses; and a host of other difficulties, is open to question.

The SCOPE report (ref. 3.11), the most comprehensive analysis of the biological implications of nuclear winter, does not explicitly address human extinction, but it does indicate that the death of several billion people, mainly from starvation, is possible in the climatic aftermath of a large-scale nuclear war. That would be added to the estimated prompt casualties of many hundreds of millions, severe post-traumatic stress on the survivors (ref. 5.14), and a range of as yet undiscovered synergisms among the individually adverse environmental consequences. Small groups of survivors would be particularly vulnerable to accidental unfavorable fluctuations in the physical or biological environment (ref. 5.15). The conclusion remains: Human extinction is by no means excluded (ref. 5.16).

But the issue is of such complexity and is so alien to our experience that it is beyond our present ability to predict reliably. We simply do not know.>

Nuclear war risks all life

Bayev in '84

(Academician, Secretary of the Biochemical, Biophysical and Chemical Physiology Department at the USSR Academy of Sciences, "The Cold and the Dark: The World After Nuclear War", p. 140-141)

Academician Bayev: The opinion of biologists and medical experts about nuclear war is quite definite: nuclear war is immoral and is not permissible because of the enormous losses it will bring for human beings. It is inadmissible because it raises the question of whether the very survival of mankind is possible, or even whether continued life on Earth in the forms that we know it is possible.

Nuclear war could cause extinction

Erlich in '84

(Paul, Professor of Biological Sciences at Stanford, "The Cold and the Dark: The World After Nuclear War", p. 62)

Society in the Northern Hemisphere would be highly unlikely to persist. In the Southern Hemisphere tropics, events would depend in large part on the degree of propagation of the atmospheric effects from North to South. But we can be certain that, even if there were not a spread of atmospheric effects, people living in those areas would be very, very strongly impacted by the effects of the war—just by being cut off from the Northern Hemisphere.

And, I repeat, if the atmospheric effects did spread over the entire planet, then we cannot be sure that Homo Sapiens would survive.

didn't think we had cards on that did you?

Extensions: Nuclear War Causes Climate Change – Massive Cooling

Nuclear war causes massive forest loss, soil erosion and climate change
Woodwell in '83

(G.M. Director of Ecosystems Center of the Marine Biological Laboratory at Woods Hole, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p. 135-138)

The radiation exposures required to transform a forested zone into an impoverished landscape are well within the range of contemporary war, a few hundred to many thousands of roetgens. The areas affected might be large, tens to hundreds of square miles per bomb. Enough bombs are available that minor military and civilian centers, universities, colleges, small industrial or scientific centers, even individual laboratories, can all be individually favored with nuclear attention, providing overlapping zones affected by blast, heat and ionizing radiation from the fireballs. The fallout fields will also overlap, and cover hundreds of thousands of square miles.
The biotic effects of such transitions are beyond human experience. The uncertainties of weather would cause anomalies in the distribution of fallout, sparing some areas, depositing heavier doses elsewhere. The result would probably be a mottled necrosis of the landscape, with whole valleys escaping virtually untouched by fallout, others scorched by radiation and subsequently by fires feeding on the devastation. The process started by irradiation from fallout would proceed variously in different places. Certain areas of the tropics serve as a model for impoverishment: once the tree canopy has been destroyed, the soils made vulnerable to erosion, and the stock of nutrients lost, the potential for recovery to forest is lost indefinitely. In other areas recovery is rapid, soils are not lost, fires do not compound the damage and the site becomes revegetated with forest in a decade or so. Between these extremes lie a full range of intermediate possibilities, all of which involve varying degrees of biotic impoverishment. (However, an increased frequency of the small-bodied, rapidly-reproducing organisms that we so often find in competition with man and label "pests" can be expected. a corollary of the disturbance is the stimulation of indigenous pests that thrive on weakened plants. For instance Ips, a bark-beetle destroyed weakened pines in the Brookhaven Irradiated Forest, and extraordinarily high populations of aphids and other insects occurred on radiation weakened trees). The impoverishment includes the loss of both forest products for man and the loss of the array of services the biota normally performs in maintaining an environment suitable for man.
I have emphasized effects on forests because forests dominate the natural vegetation in most of the habitable sections of the globe. Forests, moreover, have an extraordinarily large influence on the rest of the biosphere. They have the capacity for fixing and releasing enough carbon to change the CO2 content of the atmosphere by several parts per million in a few weeks. The massive destruction of forests following an exchange of nuclear weapons can be expected to contribute a further surge in the rate of release of CO2 from the biota and soils into the atmosphere, compounding the growing problem of a CO2-caused climatic warming. Such analyses, however, are sufficiently complex and uncertain to be speculative, and require a much more elaborate analysis than can be offered here.

A nuclear winter would result in temperatures lower than those during the Ice Age
Sagan and Turco, 1990 (Carl and Richard, astrophysicist and astronomer at Cornell University, and founding director of UCLA's Institute of the Environment, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race," pg 24-26)

<A typical temperature of a point on the land surface of the Earth, averaged over latitude, season, and time of day, is roughly 15°C (59°F). If there were no greenhouse effect whatever, the corresponding temperature would be about ~20°C (— 4°F). The difference between the planetary environment with the greenhouse effect and without it is the difference between clement conditions and deep freeze. Tampering with the greenhouse effect—especially in ways that reduce it—can be very risky.
These two temperatures, with and without the greenhouse effect, are shown near the top in Figure 1. If we were to double the present concentration of the greenhouse gas carbon dioxide in the Earth's atmosphere—as will happen in a few decades if present trends continue—the surface temperature will likely increase by a few degrees, as the diagram shows. Following a major volcanic explosion the temperature can decrease by as much as a few degrees. During an Ice Age, the global temperatures are a few degrees colder yet, approaching the freezing point of water. And in a nuclear winter, depending on severity, the temperatures can become still colder, ranging well below freezing. Just how cold it gets depends on many variables, including how the nuclear war is "fought," as we describe later. But even the middle range of these nuclear winter effects (see Figure f) represents the severest climatic catastrophe ever to have occurred during the tenure of humans on this planet. Even in the range of temperature overlap, a mild nuclear winter is harsher than a severe Ice Age, because of its rapid onset (weeks rather than centuries or millennia)—although its duration is much briefer.>

Nuclear war risks extinction through subfreezing temperatures, starvation, and biosphere disruption
Ehrlich et al, 1983

(Paul R. Ehrlich, Stanford University; Mark A. Harwell, Cornell University; Carl Sagan, Cornell University; Anne H. Ehrlich, Stanford University; Stephen J. Gould, Harvard University; biologists on the Long-Term Worldwide Biological Consequences of Nuclear War (Cambridge, Massachusetts, 25 and 26 April 1983)., Science, New Series, Vol. 22, No. 4630, Dec. 23, 1983, pg 1293-1300, jstor)

Subfreezing temperatures, low light levels, and high doses of ionizing and ultraviolet radiation extending for many months after a large-scale nuclear war could destroy the biological support systems of civilization, at least in the Northern Hemisphere. Productivity in natural and agricultural ecosystems could be severely restricted for a year or more. Postwar survivors would face starvation as well as freezing conditions in the dark and be exposed to near-lethal doses of radiation. If, as now seems possible, the Southern Hemisphere were affected also, global disruption of the biosphere could ensue. In any event, there would be severe consequences, even in the areas not affected directly, because of the interdependence of the world economy. In either case the extinction of a large fraction of the Earth's animals, plants, and microorganisms seems possible. The population size of Homo sapiens conceivably could be reduced to prehistoric levels or below, and extinction of the human species itself cannot be excluded.>

Extensions: Nuclear War Causes Climate Change

Greenhouse gases are key to maintain earth temperatures at livable levels – nuclear winter risks catastrophic changes

Sagan and Turco, 1990

(Carl and Richard, astrophysicist and astronomer at Cornell University, and founding director of UCLA's Institute of the Environment, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race," pg 22-3)

<It is a central fact of our existence that the Earth would be some 35°C colder than it is today if the global temperature were to depend only on how much sunlight is absorbed by the Earth. This is a calculation routinely performed in introductory astronomy and climatology courses: You consider the intensity of sunlight reaching the top of the atmosphere, subtract the fraction of sunlight that's reflected back to space, and let the remainder —which is mainly absorbed by the Earth's surface—account for our planet's temperature. You balance the amount of radiation heating the Earth with the amount that is radiated (not reflected) by the Earth back to space. The temperature you derive is, disturbingly, some 35°C colder than the actual surface temperature of the Earth. If this were all there were to the physics, the average temperature of the Earth would be below the freezing point of water; the oceans, still kilometers thick, would be made of ice; and almost all familiar forms of life— ourselves included—would never have come to be.

The missing factor, what we have ignored in this simple calculation, is the increasingly well-known "greenhouse" effect. Gases in the Earth's atmosphere, mainly water vapor and carbon dioxide, are transparent to ordinary visible sunlight but opaque to the infrared radiation that the Earth radiates to space as it attempts to cool itself off. These greenhouse gases act as a kind of blanket, warming the Earth just enough to make the clement and agreeable world we are privileged to inhabit todav. Were the greenhouse effect to be significantly meddled with—turned up or down, much less turned off—it would constitute a planetwide disaster. This is in part what nuclear winter is about. >

A2: Carbon Dioxide Offsets Cooling

CO2 won't offset cooling from nuclear war
Sagan in '84
(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, "The Cold and the Dark: The World After Nuclear War", p. 30-31)

DR. LARRY SMARR (Associate Professor of Astronomy and Physics, University of Illinois): The recent EPA and Science reports on the greenhouse effect mentioned the warming effects of CO2. I presume enormous quantities of CO2 will be a by-product of fires. In what sense have you taken these into account and in what sense can the warming effect of the CO2 oppose the cooling effect of the dust?
DR. SAGAN: I am glad you raised this question because it is a potential source of confusion; that is, two recent reports, one of which says burning fossil fuels puts gases into the atmosphere which heat the Earth, and another which you just heard, saying that nuclear war puts particles into the atmosphere that cool the Earth. Perhaps someone might think that the two effects cancel each other out. That is not our conclusion for more reasons than one.
First, the CO2 put up even with all this burning is simply not enough to make any significant contribution to the greenhouse effect. The current value of 0.03 percent of the Earth's atmosphere by volume of CO2 represents about three orders of magnitude more CO2 than would be released in the burning of cities and forests.
Also let me stress that the CO2 greenhouse effect is a long-term trend. There is no undoing it on time scales of decades. What we are talking about here is a sudden low-temperature nuclear war pulse in the system which then has a few years' decay time, superimposed on this very slow temperature increase from the burning of fossil fuels.

Extensions: Nuclear War Kills Phytoplankton

Nuclear war wipes out plankton
Seymour in '83

(Allyn, Marine Biologist and Professor Emeritus at University of Washington, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p. 113)

Other effects may result from a drastic reduction in the incidence of solar light at the earth's surface or a significant increase in the flux of ultraviolet light following a nuclear war. Both factors have the potential to produce devastating effects upon marine populations at the bottom of the food chain. Crutzen and Birks (10) state, "If the production of aerosol by fires is large enough to cause reductions in the penetration of sunlight to ground level by a factor of a hundred, which would be quite possible in the event of an all-out nuclear war, most of the phytoplankton and herbivorous zooplankton in more than half of the Northern Hemisphere oceans would die . . . This effect is due to the fast consumption rate of phytoplankton by zooplankton in the oceans."

The increase in the flux of ultraviolet (uv) light at the earth's surface is associated with the introduction of nitrous oxide (NO,,) into the stratosphere, which would reduce the ozone reservoir and permit uv penetration. Bacteria and yeasts in the surface film of the ocean would receive the greatest exposure, but their vulnerability to injury may be tempered by their long history of exposure to natural uv. However, other marine organisms appear to have little reserve tolerance to uv, and the effectiveness of uv-B in killing bactera and other microorganisms is well established(11).

Nuclear war crushes plankton collapsing the base of the ocean food chain
Seymour in '83

(Allyn, Marine Biologist and Professor Emeritus at University of Washington, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p. 119)

Two other consequences of nuclear war, however, do have the potential for devastating effects upon marine ecosystems. It has been predicted (10) that a 100-fold reduction in solar light intensity at the earth's surface due to particles in the atmosphere is possible; this would result in death to most of the phytoplankton and herbivorous zooplankton in more than half of the oceans of the Northern Hemisphere. And under some circumstances the depletion of ozone in the stratosphere by NOx could increase uv radiation at the earth's surface, and the magnitude of the change would be sufficient to seriously reduce the populations of organizations at the base of the food web (11). Temperature changes would be of little consequence. Although the impact of ionizing radiation on ocean systems may be less than elsewhere, nothing that has been said here should be interpreted as an argument lending credence to or justifying a nuclear war.

Nuclear war devastates phytoplankton populations
Erlich in '84

(Paul, Professor of Biological Sciences at Stanford, "The Cold and the Dark: The World After Nuclear War", p. 57)

In the oceans, the darkness would inhibit photosynthesis in the tiny green plants (algae) that form the base of all significant marine food chains. The reproduction of these plants, known collectively as phytoplankton, would be slowed or stopped in many areas, and the surviving phytoplankton would be quickly eaten up by the small floating animals (zooplankton) that prey upon them. Near the ocean's surface, the productivity of phytoplankton is reduced by present levels of UV-B; so after a war, an increase in this sort of radiation would be an additional stress. In the Northern Hemisphere, marine food chains might be disrupted for long enough to cause extinction of many valuable fish species, especially after a spring or summer war.

Extensions: Nuclear War Collapses Ozone

Nuclear war would cause substantial ozone depletion
Crutzen and Birks in '83

(Paul, Director of the Air Chemistry Division of the Max Planck Institute for Chemistry, and John, Associate Professor of Chemistry and Fellow of the Cooperative Institute for Research in Environmental Sciences, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p. 74)

Previous investigations of the atmospheric effects following a nuclear war have been concentrated primarily on the expected large depletions of ozone in the stratosphere (1,2). Reduction of the stratospheric ozone shield allows increased levels of harmful ultraviolet (uv) radiation to penetrate to the surface of the earth. Such ozone depletion results from the injection of oxides of nitrogen (NO x) by large nuclear weapons having yields greater than one megaton. Should the nations having nuclear arsenals choose to use their large warheads in a nuclear war, then the earth's protective ozone layer would be -much depleted, and the consequent adverse effects associated with the increased flux of ultraviolet radiation would occur. Our conclusions for such a scenario concur with those found in the 1975 report of the US National Academy of Sciences (1).

Nuclear war would totally collapse food production in the northern hemisphere and cause mass ozone depletion
Crutzen and Birks in '83

(Paul, Director of the Air Chemistry Division of the Max Planck Institute for Chemistry, and John, Associate Professor of Chemistry and Fellow of the Cooperative Institute for Research in Environmental Sciences, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p.90)

In this chapter we have shown that the atmosphere would most likely be highly perturbed by a nuclear war. We especially draw attention to the effects of the large quantities of highly sunlight-absorbing, dark particulate matter which would be produced and spread in the troposphere by the many fires that would start burning in urban and industrial areas, oil and gas producing fields, agricultural lands, and forests. For extended periods of time, maybe months, such fires would strongly restrict the penetration of sunlight to the earth's surface and change the physical properties of the earth's atmosphere. The marine ecosystems are probably particularly sensitive to prolonged periods of darkness. Under such conditions it is likely that agricultural production in the Northern Hemisphere would be almost totally eliminated, so that no food would be available for the survivors of the initial effects of the war. It is also quite possible that severe, worldwide photochemical smog conditions would develop with high levels . of tropospheric ozone that would likewise interfere severely with plant productivity. Survival becomes even more difficult if stratospheric ozone depletions also take place. It is, therefore, difficult to see how much more than a small fraction of the initial survivors of a nuclear war in the middle and high latitude regions of the Northern Hemisphere could escape famine and disease during the following year.

Nuclear war causes massive ozone depletion – the impact is devastating UV radiation
SGR 2003

(Scientists for Global Responsibility, Newsletter, "Does anybody remember the Nuclear Winter?" July 27, http://www.sgr.org.uk/climate/NuclearWinter_NL27.htm)

<While the temperature at the surface would be low, the temperature of the upper part of the troposphere (5-11 km) would rise because of sunlight absorbed by the smoke, so there would be a huge temperature inversion. That would keep many other pollutants produced by widespread fires (e.g. dioxins, PCBs, sulphurous gases) down at the levels people breathe, making a very dense and highly toxic smog.
One further environmental problem would be widespread destruction of the ozone layer caused by high levels of nitrogen oxides. The average loss of ozone could be as much as 70% - much higher than that currently cause by CFCs. So after several months when the smoke cleared and the sun began to shine again, there would be a large increase of UV radiation reaching the earth's surface. This would be bad for humans (e.g. eye and skin damage), but the major effect would be for other living things, notably sensitive plankton, which are at the bottom layer of the whole marine food chain. Animals would also suffer - blindness would be common - and blind animals would quickly starve.
Altogether, nuclear winter would be an ecological disaster of a similar magnitude to the major extinctions of the past, such as that at the end of the Cretaceous period 65 million years ago when 75% of all species died out, including the dinosaurs. An added factor after a nuclear war would be radioactive contamination giving worldwide background radiation doses many times larger than has ever happened during the 3 billion years of evolution.>

Extensions: Nuclear War Collapses Ozone

Nuclear war destroys the ozone layer, killing plankton and all animal life
Philips, 2000
(Alan, Dr. with Physicians for Global Survival, "NUCLEAR WINTER REVISITED", October, http://www.peace.ca/nuclearwinterrevisited.htm)

< Another bad environmental thing that would happen is destruction of the ozone layer. The reduction in the ozone layer could be 50% - 70% over the whole northern hemisphere - very much worse than the current losses that we are properly concerned about. Nitrogen oxides are major chemical agents for this. They are formed by combination of the oxygen and nitrogen of the air in any big fire and around nuclear explosions, as they are on a smaller scale around lightning flashes. So after the smoke cleared and the sun began to shine again, there would be a large increase of UV reaching the earth's surface. This is bad for people in several ways, but don't worry about the skin cancers ? not many of the survivors would live long enough for that to matter. UV is also bad for many other living things, notably plankton, which are the bottom layer of the whole marine food chain. There would likely be enough UV to cause blindness in many animals. Humans can protect their eyes if they are aware of the danger. Animals do not know to do that, and blind animals do not survive. Blind insects do not pollinate flowers, so there is another reason why human crops and natural food supplies for animals would fail.>

Nuclear war destroys the ozone causing terminal blindness
Erlich in '84
(Paul, Professor of Biological Sciences at Stanford, "The Cold and the Dark: The World After Nuclear War", p. 50-51)

As the cold and darkness abated, green plants would be subjected to another serious insult. Nuclear fireballs would inject large amounts of nitrogen oxides into the stratosphere. These would result in large reductions of the stratospheric ozone shield—on the order of 50 per-cent. Ozone normally screens out UV-B. In the weeks or months immediately following the war, the atmospheric soot and dust would prevent the increased UV-B from reaching ground level. But the ozone depletion would persist longer than the soot and dust, and, as the atmosphere cleared, organisms would be subjected to UV-B radiation levels much higher than those considered dangerous to ecosystems and human beings.
One response of plants to increased UV-B is reduction of photosynthesis. Furthermore, leaves that have developed in dim light are two to three times more sensitive to UV-B than those that have developed in full sunlight. Thus UV-B will compound the damage caused by earlier low levels of light. The immune systems of Homo sapiens and other mammals are known to be suppressed by even low doses of UV-B. Thus mammals that were subjected to increased ionizing radiation (which also suppresses the immune system), diseases, and a host of other stresses in a postwar world might have one of their most important defenses impaired. It has also been suggested that protracted exposure to increased UV-B could lead to widespread loss of sight. Survivors among people and other mammals might again find themselves in darkness soon after the sky cleared.

Extensions: Ozone Depletion Causes Extinction

Destruction of the ozone layer causes extinction
Earth and Society in '98

(A Project out of the University of Michigan, "The Ozone Layer: Important Components of Ozone Education", http://www.umich.edu/~gs265/society/ozone.htm)

The ozone layer is essential for human life. It is able to absorb much harmful ultraviolet radiation, preventing penetration to the earth?s surface. Ultraviolet radiation (UV) is defined as radiation with wavelengths between 290-320 nanometers, which are harmful to life because this radiation can enter cells and destroy the deoxyribonucleic acid (DNA) of many life forms on planet earth. In a sense, the ozone layer can be thought of as a ?UV filter? or our planet?s ?built in sunscreen? (Geocities.com, 1998). Without the ozone layer, UV radiation would not be filtered as it reached the surface of the earth. If this happened, ?cancer would break out and all of the living civilizations, and all species on earth would be in jeopardy? (Geocities.com, 1998). Thus, the ozone layer essentially allows life, as we know it, to exist.

Ozone depletion risks all life
Sagan and Turco in '90

(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, and Richard, Professor of Atmospheric Sciences at UCLA, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race", p. 58)

Ozone depletion threatens the food chains on which almost all life on Earth depends. In the oceans, there are tiny microscopic plants, called phytoplankton, which are highly vulnerable to increases in ultraviolet light; and which, directly or indirectly, other animals in the marine food chain including humans—eat. Land plants, including crops, are also vulnerable to increased ultraviolet light, as are most microbes, including those essential for the food chain. (Ultraviolet lamps were once used in hospital operating rooms to kill potential disease microorganisms.) We are far too ignorant of the global ecological interactions to understand fully what propagating biological consequences an assault on the ozone layer would entail (refs. 4.10, 6.3). But it doesn't take a great depth of understanding to recognize that if you rip up the base of the food chain, you may generate a disaster among the beings that totter precariously near the pinnacle. Recovery of the ozone shield would probably take several years. By then enormous damage would have been wrought.

A2: Nuclear Winter Studies (TTAPS) Bad

The USFG confirms Sagan's study – the effects of nuclear war would be devastating – nuclear winter is real and devastating
Newsweek, 1986
(SHARON BEGLEY with JOHN BARRY, "A Milder Nuclear Winter," March 31, lexis)

The TTAPS scenario immediately came under attack. It was propaganda masquerading as science, critics said; the calculations were riddled with uncertainties. Said George Rathjens of the Massachusetts Institute of Technology at a recent conference: nuclear-winter theory is "the worst example in my memory of results being misrepresented to the public." But the theory also prodded the U.S. government to look into the issue. And while the original model has been adjusted, in general the result -- to be reported to Congress by Defense Secretary Caspar Weinberger this week -- is like a good-news, bad-news joke. As C. Milton Gillespie, Defense Nuclear Agency's director of nuclear-winter research, puts it: "If I had to sum up, I'd say that the climatic effects look to be less than we thought, but that it probably takes less than we thought to have an impact on the global environment."
More sophisticated models of "the day after" suggest that even an all-out nuclear war would cause temperatures to fall only half as much as first calculated. The National Center for Atmospheric Research in Boulder, Colo., assumed an exchange totaling 5,000 megatons and generating 180 million tons of smoke. It calculated that temperatures in the Northern Hemisphere would drop an average of 22 degrees Fahrenheit, with prolonged freezes only in the far north. "This looks more like nuclear fall than nuclear winter," says Stephen Schneider of NCAR. "We aren't getting the extinction-of-humanity scenario."
Quick freeze: But even NCAR's vision is a bleak one. Before the smoke dissipated, it would circulate in patches that would cover whole states. Wherever these clouds hovered, they would produce a localized freeze in summer. Worse yet, during the growing season crops are so sensitive to temperature drops of only a few degrees that the exact extent of the chill is "essentially irrelevant," says Mark Harwell of Cornell University, coleader of the biggest international study of the biological consequences of nuclear winter. A dip of 5 degrees over a growing season would wipe out Canadian wheat. With a drop of 13 degrees, which is at the low end of current forecasts, "you've lost all agricultural production," says Harwell. The climate models show that some smoke would also leak into the Southern Hemisphere -- assuming a northern war -- threatening fragile tropical ecosystems. A single night of sub-60-degree temperatures would keep rice from maturing. The aftermath of nuclear war, says Harwell, "would be less like Hiroshmina than like Ethiopia."
For nuclear strategy, the implications of even modified nuclear-winter theory are profound. Behine the scenes in the Pentagon, it has touched off an intense debate. Under Secretary of Defense Fred Ikle and Assistant Secretary Richard Perle say that the predictions underline the immediate need for missiles whose accuracy would allow lower-yield warheads. They also say the scenarios heighten the need to move from offensive to defensive weapons, as in President Reagan's Strategic Defense Initiative. But Richard Wagner, the Defense Department's assistant for atomic energy, argues that more research is needed before any policy implications can safely be drawn.
At the heart of the debate is the question of whether nuclear-winter theory rules out the concept of "limited nuclear war," in which only military sites would be targeted. For 20 years, U.S. strategists have explored "limited" war scenarios, reasoning that both superpowers had an incentive to confine nuclear conflict as a way of sparing major population centers. The initial nuclear-winter models left open the possibility that "limited" strikes would not trigger global disaster. But the latest findings suggest that even limited use of nuclear weapons might have drastic climatic effects. In the meantime, if nuclear winter does not persuade the superpowers to dismantle their arsenals, its doomsday potential should make them more committed to stabilizing their relationships.?>

In spite of your lies about Sagan independent assessments confirm TTAPS – no study since 1990 has been conducted but future studies would confirm our argument
Philips, 2000
(Alan, Dr. with Physicians for Global Survival, "NUCLEAR WINTER REVISITED", October, http://www.peace.ca/nuclearwinterrevisited.htm)

<*Governments did not like the idea of Nuclear Winter* The prediction of nuclear winter was published by a group headed by Carl Sagan in 1983. The initials of their names were T-T-A-P-S, so the paper and their book has become known as "t-taps". It caused some alarm in government circles in U.S.A. and NATO countries, not so much because this further disaster would follow a nuclear war, but because of the boost it gave to the Peace Movement.
A number of studies were published in the next few years, including major reports by The Swedish Academy of Sciences (Ambio), the International Council of Scientific Unions (SCOPE), and the U.S. National Research Council.
There was a drive by government and the military establishment to minimize the matter, and after a few years the media were talking about "nuclear autumn". (The most astonishing lies were propagated, e.g. that Carl Sagan admitted that his publication was "a propaganda scam".) It was true that islands and coastal areas would have less severe temperature drops than the original predictions, because of the modifying effect of the ocean. They would have violent storms instead, because of the big temperature difference between land and water.
In 1990 another paper was published by the T-TAPS group reviewing in detail the later studies, and showing that some modifications to their 1983 paper were necessary. Some of these were in the direction of more severe changes, others towards milder changes. The general picture was little changed. The book: "A Path Where No Man Thought" by Sagan and Turco (one of the T's), also published in 1990, gives an account of current conclusions for the serious non-specialist reader. It gives detailed descriptions of nuclear winters of different severity according to how many weapons were used, and against what targets. If oil refineries and storage were the main targets, 100 bombs would be enough to cause a nuclear winter, and the smallest sizes of nuclear bombs would be effective in starting the fires.
A new study needed
Nuclear Winter seems to be a matter that the peace movement has largely forgotten about, and the general public has completely forgotten about. As far as I can find out, no new scientific study has been published on the matter since 1990. I feel sure we ought to be reminding the world of it. A new scientific study is surely warranted by now. Computer modelling is a main tool in atmospheric research, and the capacity of computers available to university scientists and in government laboratories has increased very much in the last 10 years; other atmospheric research has not been dormant. The advances need to be applied. If a new study happened to show that the aftermath of nuclear war would *not* include severe changes in the weather and climate it would be great news for the nuclear weapon establishments, and slightly good news for those who are working for elimination of nuclear weapons, but we should carry on just the same. If, as seems more likely, the new study largely confirmed the T-TAPS results it would strengthen our position in dialogue and provide a focus for a publicity campaign to re-awaken the voting public to the need to eliminate nuclear weapons, and the urgent need to de-alert them...>

A2: Nuclear Winter Studies (TTAPS) Biased

Soviet scientists confirm INDEPENDENTLY that small nuclear war could lead to nuclear winter
Weston in '87
(Burns, Iowa College of Law, American Journal of International Law, 81 A.J.I.L. 1003, L/N)

As The Night After illustrates, however, these views are misleading half-truths at best, dangerous illusions at worst. A collection of interdisciplinary scientific studies on the environmental effects of a nuclear exchange between the United States and the USSR, prepared by the Soviet Scientists' Committee for the Defence of Peace Against Nuclear War (an organization of prominent Soviet scientists formed in May 1983), it is in actuality part of a continuing Soviet dialogue with the Western scientists -- Paul Ehrlich and Carl Sagan at the National Center for Atmospheric Research -- who first propounded the theory of "nuclear winter" 3 years ago. Furthermore, it is conspicuously evident that Soviet scientific, political and military elites are concerned not only about the dangers of nuclear war, but also about the proposition that nuclear war is winnable in any meaningful sense.
What is particularly noteworthy about The Night After, however, is the fact that, though based on different research programs and methodologies, it chronicles findings that are completely consistent with those reached by the American scientists. Even a relatively small nuclear war, it tells us, could so blot out the sun and so damage the ozone because of the smoke, soot and dust it would place in the atmosphere that it would produce literally months of subfreezing temperatures worldwide, creating an unprecedented climatic catastrophe that would cause widespread agricultural failure and mass [*1004] human starvation. With these findings, of course, The Night After, like its American counterpart, helps to focus responsible attention on the fact that nuclear war directly implicates human extinction, hence, national suicide by any state irrational enough to launch a nuclear first strike on the misguided assumption that it would not suffer equivalent damage.

The overwhelming evidence in multiple studies confirms nuclear winter theory
Sagan and Turco in '90
(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, and Richard, Professor of Atmospheric Sciences at UCLA, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race", p. 34-35)

In the years since the original TTAPS (ref. 2.2) study, the scientific basis of the nuclear winter theory has been extended, refined, and strengthened. Findings have been published by scientists in the U.S., U.S.S.R., U.K., both Germanys, Japan, China, Brazil, Australia, New Zealand, Canada, and Sweden, among other nations. Data from many fields have been analyzed and applied to the problem. Important insights into related problems in the atmospheric sciences have emerged because of nuclear winter (ref. 3.4). It has provided an impetus for the rapid evolution of computer models of the three-dimensional general circulation of the Earth's atmosphere; these models have later proved important for studies of greenhouse warming (ref. 3.5). Yet, the central points remain unchanged: The key climatic predictions of the original nuclear winter theory have been generally confirmed, and the potential societal and human impacts remain extremely serious on a global scale. The foregoing statements are at variance with some commentaries on nuclear winter that have appeared in print (ref. 3.6). However, we are talking here about a scientific theory that has evolved in an orderly manner (ref. 3.7). In science, valid criticisms are—on the weight of the evidence, and through common consent—rapidly integrated into a theory, or cause it to be superseded. Invalid criticisms are eventually rejected, as has been the fate of many early critiques of nuclear winter. So, for example, the criticisms that there is less to burn in cities and that a given amount of burning releases more soot than TTAPS estimated are valid, and the newer numbers are used in modern calculations. (Note that these two changes have offsetting consequences.) But the criticism that the great preponderance of the smoke would be promptly washed out by rainfall is invalid, and in modern calculations much of the smoke persists for months or years.

Your authors are pentagon nut-jobs – their ideological agenda is to make the nuclear winter problem "go away"
Sagan and Turco in '90
(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, and Richard, Professor of Atmospheric Sciences at UCLA, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race", p. 33-34)

THE THEORY OF NUCLEAR WINTER, FIRST INTRODUCED IN 1982, has been a subject of controversy (ref. 3.1). Debate is common when new scientific ideas are introduced, and healthy. However, much of the controversy over nuclear winter has been artificially generated at the borderline where science and policy intersect. Some has been fueled by confusion among nonspecialists over certain technical findings, and by comparisons of various computer models without sufficient care having been taken to resolve, or even to note, differences in initial assumptions. Among the troubling issues, laden with ideological connotations, raised by the nuclear winter theory are the possibilities that a major consequence of nuclear war eluded the American and Soviet nuclear arms establishments for thirty-seven years (ref. 3.2); that a "small" nuclear war might have widespread, perhaps even global, catastrophic climatic consequences; that distant nations would be in jeopardy, even if not a single nuclear weapon were detonated on their soil; that massive retaliation, and equally, attempts at a disarming first strike, in a variety of policy frameworks, would be disastrous for the nation employing such policies (and for its allies)—independent of its adversary's response; and that the size and nature of the present nuclear arsenals as well as the central role of nuclear weapons in the strategic relations of the United States and the Soviet Union may be not merely imprudent, but a policy mistake unprecedented in human history.
"Pentagon officials are plainly worried about the nuclear winter problem, " wrote Thomas Powers in late 1984 (ref. 2.6), and plainly at a loss over what to do about it. In conversation with officials at the nuts-and-bolts level one picks up interesting nuances of reaction: a wistful hope that "more study" will make the nuclear-winter problem go away, embarrassment at having overlooked it for nearly forty years, resentment that the peacenik doom-mongers might have been right all these years, even if they didn't know why they were. Above all, one finds a frank dismay at what the nuclear-winter problem does to a defense policy based on nuclear weapons. Being only human, officials are probably hoping to turn up uncertainties enough to justify more study forever, or at least until the next Administration. Nuclear winter seems to challenge a wide range of well established interests and beliefs. As Powers predicted, some critics have sought to minimize the significance of nuclear winter or the urgency of its policy implications by pleading unresolvable uncertainties, or emphasizing less severe effects (ref. 3.3). We shall argue here that neither approach is any longer tenable.

A2: Nuclear Winter Studies (TTAPS) Biased

Later estimates confirm TTAPS was correct – nuclear winter is true

Sagan and Turco in '90

(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, and Richard, Professor of Atmospheric Sciences at UCLA, "A Path Where No Man Thought: Nuclear Winter and the End of the Arms Race", p. 21-22)

We tried to find errors in our calculations. (There were those who volunteered to assist us in this task.) Many of our estimates of input parameters turned out to be correct. In a few other cases our choices were inaccurate, but as it turned out the errors tended to cancel each other. In no case, we believe, did we get the fundamental physics wrong. A comparison of our original conclusions with modern results is given in Appendix B. Much progress has been made since our 1982/1983 work, much more accurate estimates of nuclear winter are now available, and much deeper insights into this fascinating and doleful subject are now at hand.
Checking for potential errors was an exercise in self-knowledge. We discovered in ourselves a wrenching ambivalence. When a potential source of error did not materialize we were elated; we had done the calculations right. But that feeling was soon replaced by another: The consequences for humanity that kept emerging were so dire that repeatedly we found ourselves hoping we had made a mistake. Unfortunately, or perhaps fortunately (an ambivalence persists), the central thesis of nuclear winter seems more valid today than ever before—unfortunately, because if we are so foolish as to permit a nuclear war, we now know it might constitute a worldwide disaster unparalleled in the history of our species; but fortunately, because the consequences are so serious, and so widespread, that a general understanding of nuclear winter may help in bringing our species to its senses.

The concept of nuclear winter has been confirmed the scientific community and peer-reviewed

Sagan et al, 1986 (Carl, Professor at Cornell, Richard Turco, R&D Associates, O.B. Toon, Thomas Ackerman and James Pollack, NASA Ames Research Center, Wall Street Journal, "Letters to the Editor: Nuclear Winter Remains a Chilling Prospect", December 12, Proquest)

<While many groups, including ourselves, have stressed that uncertainties remain in the theory, major scientific reviews conclude that nuclear winter is a "clear possibility" (U.S. National Academy of Sciences!; "a credible threat" (Royal Society of Canada!, and may kill more people than the direct effects of nuclear war (U.S Department of Defense). A two-year study of the Scientific Committee on Problems of the Environment (SCOPE! of the International Council of Scientific Unions concludes- "As representatives of the world scientific community drawn together in this study, we conclude that many of the serious global environmental effects are sufficiently probable to require widespread concern. Because of the possibility of a tragedy of an unprecedented dimension, any disposition to minimize or ignore the widespread environmental effects of a nuclear war would be a fundamental disservice to the fulure of global civilization."
The basic science of nuclear winter has been comprehensively peer-reviewed and is widely available to anyone interested in obtaining it>

Predicted nuclear winter scenarios have been backed up by numerous scientific studies

Sagan et al, 1986 (Carl, Professor at Cornell, Richard Turco, R&D Associates, O.B. Toon, Thomas Ackerman and James Pollack, NASA Ames Research Center, Wall Street Journal, "Letters to the Editor: Nuclear Winter Remains a Chilling Prospect", December 12, Proquest)

<To demonstrate the vitality of the nuclear-winter theory, we compare our original predictions-set forth in late 1982 and early 1983 as a series of physical mechanisms-with the present state of knowledge, bearing m mind that any such complex concept must undergo evolution and refinement: In 1983, we predicted that the burning of urban flammable materials in a nuclear exchange could generate enough smoke to darken the sky over much of the globe. Today, detailed assessments show, through the combination of available fuel types, amounts and smokiness, that global smoke palls could indeed be produced; moreover, the probability of such widespread palls is quite high given the existing nuclear arsenals and targeting plans. (On the other hand, our initial high estimates of smoke production from wildland fires have been lowered substantially through more comprehensive analyses, although the smoke from burning cities has remained the most important contributor to nuclear winter)
In 1983 we predicted that urban smoke plumes would rise into the middle troposphere. and "firestorm" plumes into the lower stratosphere. New observations and simulations of large-scale fire dynamics confirm these height estimates. In 1983 we predicted that extensive smoke layers would spread over most of the Northern Hemisphere in a matter of days to weeks. Analyses of satellite images reveal that such regional dispersion is a common feature of large wildfire complexes; global-circulation models show initial smoke patches spreading within a week or two to cover the hemisphere.
In 1983 we predicted that land temperatures beneath widespread, elevated smoke clouds could drop rapidly, and that sub-freezing continental temperatures could occur in any season. All of the global climate-modeling studies to date-including the most recent "autumn" calculations from NCAR-show this effect, with most of the forecasts indicating some freezing temperatures even in mid-summer. In 1983 we predicted that upper-level smoke layers would become heated and thus superstabi-hzed, greatly extending the lifetime of the smoke in the atmosphere. All of the advanced global wind models used to study nuclear winter now show the formation of such a long-lived "smokosphere." In 1983 we predicted that the transport of smoke and nuclear debris to the Southern Hemisphere could be accelerated by the fundamentally altered nuclear-winter circulation. Subsequent atmospheric simulations fully support this possibility in the case of large smoke emissions. In 1983 we suggested that even a small fraction of the nuclear weapons m the strategic arsenals, if distributed widely over urban targets, might be enough to cause a nuclear winter. It is now found that only a few megatons out of the 12,000 megatons available would be sufficient to destroy most of the world's oil-refining and storage capacity, and induce significant global climatic change.
In 1983 we predicted that the biological impacts of the newly discovered physical effects of nuclear winter implied widespread and unparalleled mortality in humans and other organisms in a post-nuclear-war envnonment. These concerns are strongly reinforced by an in-depth biological assessment carried out under the auspices of SCOPE The assessment encompassed the work of more than 300 scientists from some 30 nations over two years.
In other words, most of the unique or important predictions of the original nuclear-winter hypothesis have been supported by later comprehensive and specialized studies. Although the term "nuclear winter" has been avoided in some of these assessments, the phenomenon considered is unambiguously nuclear winter.

A2: Nuclear Winter Studies (TTAPS) Biased

Soviet models confirm global nuclear fallout
Moiseev in '84

(Nakita, Corresponding Member of the USSR Academy of Sciences and Deputy Director of the Academy's Computing Center, "The Cold and the Dark: The World After Nuclear War", p. 143-144)

DR. MOISEEV: First I would like to thank our American colleagues for giving me this opportunity to participate in this wonderful Conference here in Washington. We share the worry of our American col-leagues and we feel that the study of the possible consequences of a nuclear conflict is one of the most important areas of concern for scientists all over the world.
In our country we are also conducting various investigations and studies in this area. In the Computing Center of the Academy of Sciences, which I represent, we are carrying out studies in three principal areas.
First, we are studying possible consequences of nuclear war for climate. Second, we are studying biological processes and changes in the productivity of the biota. Then there is a third point and a third problem. Generally speaking, we are optimists and we hope that humanity will one day show enough wisdom to give up once and for all any thought of using nuclear weapons. But if that should happen then new problems and questions would arise: How should humanity use its new might and spend its new wealth? We should direct our efforts to thinking about that problem also, if we are optimistic.
I said that this Conference was wonderful and I meant it. It is wonderful not only because of the topics that it has raised, but because of the technical opportunities it has given us. Here in Washington I can see on the screen two of my colleagues in Moscow who have participated directly in some of the calculations of various climatic effects which were done in the Computing Center of the USSR Academy of Sciences: Drs. Georgi Stenchikov and Valeri Parkhomenko. Our studies indicate that a global nuclear catastrophe. will bring about a sharp reduction in the mean temperature on Earth. Only after five or six months or so will there be modulating of the temperature on a global basis. Locally, however, the temperature changes will be much more pronounced. Even 240 days (eight months) after nuclear war, the temperature will remain much lower than the pre-war temperature in a number of regions. You can imagine what kind of ecological consequences will result from such a situation.
We have also studied the perturbations of atmospheric circulation that would result from a global nuclear conflict. We found that the whole character of the circulation would change. Instead of the classical circulation, we would be left with only one cell, and all the pollution—all the dirt from the atmosphere of the North—would wander toward the Southern Hemisphere. We can see quite clearly that there would be no place on the globe which would not experience the consequences of a global nuclear conflict.

A2: Nuclear Autumn (Winter Studies Biased)

Even a moderate nuclear winter would wipe out food sources and lead to mass starvation – the theory is sound
Schneider 1986
(Stephen, Deputy Director of the Advanced Study Program at the National Center for Atmospheric Research, Wall Street Journal, "Letters to the Editor: Nuclear Autumn", November 25, Proquest)

On the Nov 5 editonal page, Russell Seitz attempts to debunk the theory of "nuclear winter," especially the version first offered in 1983 by Richard Turco, Carl Sagan and colleagues-coliectively referred to by the acronym TTAPS Inasmuch as he reports on work by me and Starley Thompson here at the National Center for Atmospheric Research to bolster his case, I feel it is appropriate to provide our interpretations, some of which differ substantially from the impression given by Mr. Seitz.
While it is true that the magnitude of land surface cooling in the Northern Hemisphere projected by climatic modeling studies has been reduced for the most part since TTAPS calculations in 1983. I would certainly not characterize the state of the art in "nuclear-winter" research as "a shaky scientific conjecture." Nor would I describe my presentation to a scientific audience at NASA Ames laboratory in February 1986, as Mr. Seitz did, to the effect that " 'nuclear winter' had succumbed to scientific progress " Since I am cited as that "progress." let me summarize briefly what I believe current research on "nuclear winter" to be.
It is not simply "July temperatures upward of +50 degrees F. in mid-America" that Mr. Seitz reported. I said to the Ames meeting, for the figure he cites is for average temperatures in one particular case.
We have rim many cases over a range of plausible assumptions for smoke generated by fires in the aftermath of a large nuclear war, and average temperature drops in mid-America could be substantially different from that +50 F value he cites-per-haps 10 or more degrees different in either direction, depending on what assumptions are made. Moreover, the average temperature drop is of little importance, for, as every farmer knows, it isn't the average temperatures they worry about in the late spring or early fall, but the extreme cold nights.One frost can end a growing season. If this happened in the middle of a normal glowing season, it would be a disaster. Indeed, in the results we reported at Ames, and the dozen more that Stanley Thompson has computed since, frosts or near frosts do occur sporadically in our model. Therefore, although Mr. Seitz correctly notes that our work
substantially reduced the average cooling from that of the earliest work, it is not appropriate to classify our findings as he did. "The depths of Nuclear Winter could no longer be distinguished from the coolest days of summer." Those are his words, not mine
In Foreign Affairs for Fall 1986 we wrote ". . . even a more modest nuclear winter—what we called 'nuclear fall"— could be followed by mass starvation . It is probable that a whole range of indirect effects makes the already horrendous prospect of nuclear war more horrendous. and thus reinforces the need to reduce the probability that such a war will occur. Although reasonable people may disagree on what policies best achieve that end, we believe that strengthened strategic stability and multilateral reductions in global nuclear arsenals are a means to that end, and thus 'nuclear winter' does bolster those policies."
We do not agree with Mr. Seitz that the role of the TTAPS effort has been wholly negative, especially since the process of science is to step from simple ideas to more complex calculations. That is what has happened in the nuclear-winter case, a normal scientific evolution. Unfortunately, all too often the press and the public lost sight of the scientific context in which research was being carried out, focusing instead on the latest up or down calculation
"Nuclear winter" is still both a scientific and a socially important problem, even if "global Gotterdammerung" is not a likely outcome. My colleagues and I feel quite deterred from nuclear war on the basis of a billion potential casualties from direct effects, even before considering the prospect of another billion or two succumbing to the synergism of radioactivity, climatic disruption, stratospheric ozone loss or curtailment for years in the trade of food, fertilizer, spare parts or medicine, which multiplies the horror>

Even a mild nuclear winter would have devastating environmental consequences
Sagan et al, 1986 (Carl, Professor at Cornell, Richard Turco, R&D Associates, O.B. Toon, Thomas Ackerman and James Pollack, NASA Ames Research Center, Wall Street Journal, "Letters to the Editor: Nuclear Winter Remains a Chilling Prospect", December 12, Proquest)

The current best estimates for the nuclear-winter effect, as expressed in analyses by international groups and individual researchers alike, are qualitatively as serious as the earlier estimates. It is true that if we make more conservative assumptions of low-altitude smoke injection and rapid smoke washout-assumptions that are not consonant with the greater body of existing experimental data-we do find less severe "autumn" effects, as has been noted recently by S. Thompson and S. Schneider of NCAR However, the "autumn" predictions lie at the lower end of the spectrum of possible environmental disturbances, and are similar to some of the milder effects we originally reported among two dozen or so cases studied by TTAPS in which less smoke and dust were injected into the atmosphere The climate model at the Los Alamos Laboratory, as well as the model at NCAR, using plausible alternative treatments for smoke injection, dispersion and removal, show more severe "winter" effects. Moreover, even the "optimistic" milder effects are found to be catastrophic for the global human population, as spelled out in "Environmental Consequences of Nuclear War" (John Wiley, Chichester, 1986-the SCOPE report, in two volumes). Messrs. Thompson and Schneider themselves state in relation to their milder forecasts that "it is still quite plausible that climatic disturbances, radioactive fallout, ozone depletions and the interruption of basic societal services, when taken together, could threaten more people globally than would the direct effects in a large nuclear war" (Foreign Affairs, Summer, 1986; italics theirs). The 1986 assessment of the Secretary of Defense is similar: "The destructiveness for human survival of the less severe climatic effects might be of a scale similar to the other horrors associated with nuclear war."

A2: Our Nuclear Winter Indicts Post-Date

No research since 1990
SGR 2003
(Scientists for Global Responsibility, Newsletter, "Does anybody remember the Nuclear Winter?" July 27, http://www.sgr.org.uk/climate/NuclearWinter_NL27.htm)

<Since 1990, as far as we can ascertain, no new research has been carried out into the possible climatic effects of a nuclear conflict. Yet since 1990, major improvements to climate system models have occurred in the international scientific effort to understand human-induced Climate Change. Meanwhile, even though the threat of a large-scale nuclear conflict between the USA and Russia has diminished, the threat of a smaller scale nuclear conflict has perhaps increased, for example due to increasing tensions between India and Pakistan over Kashmir.>

Last scientific study was in 1990
Philips, 2000
(Alan, Dr. with Physicians for Global Survival, "NUCLEAR WINTER REVISITED", October, http://www.peace.ca/nuclearwinterrevisited.htm)

<Those of us who were involved in peace activities in the 80's probably remember a good deal about nuclear winter. Those who have become involved later may have heard little about it. No scientific study has been published since 1990, and very little appears now in the peace or nuclear abolition literature. *It is still important.*>

A2: Volcanoes Prove No Nuclear Winter

Even if volcanoes have no long term effect we shouldn't risk it with nuclear war
Crutzen and Birks in '83

(Paul, Director of the Air Chemistry Division of the Max Planck Institute for Chemistry, and John, Associate Professor of Chemistry and Fellow of the Cooperative Institute for Research in Environmental Sciences, in "The Aftermath: The Human and Ecological Consequences of Nuclear War", ed. Peterson, p.90)

Regarding possible climatic effects, little can be said with confidence. The increase in tropospheric ozone, methane and possibly other pollutant gases may lead to increased temperatures at the earth's surface (63, 64), while the dark aerosol produced by the fires will change the heat and radiative balance and dynamics of the earth and the atmosphere for awhile. Longer lasting effects may be caused by the changes in the reflective properties of the land surfaces because of many fires. In a recent study Hansen et al (65) have been able to trace observed mean global temperatures over the past 100 years with a simple climate model by introducing changes in the atmospheric CO2 content, volcanic activity and solar variability as the main driving forces. In their model the climate sensitivity was also tested for various global radiation perturbations which are relevant for this study: stratospheric aerosol, tropospheric aerosol (divided into opposite sulfate and soot effects), and atmospheric trace gas content (carbon dioxide, ozone, methane and nitrous oxide). From this study it is conceivable that climate could be sensitive over the short term to the tropospheric and stratospheric aerosol loading. It may be possible to test the impact of a nuclear war on climate with this and similar models, when these are supplied with reasonable estimates of the trace gas and aerosol composition of the earth's atmosphere. Whether the induced perturbation in the climate system could lead to longer lasting climatic changes will, however, be difficult to predict. In fact, it may seem unlikely that it will take place. The Krakatoa volcanic eruption of 1883 injected quantities of aerosol into the atmosphere comparable to those which would be caused by a nuclear war, and global mean temperatures were affected for only a few years (1). Still, we must be cautious with a prediction as the physical characteristics of the aerosol produced by volcanos and fires are different, and much is still unknown about the fundamentals of climatic changes. For instance, we may ask questions such as whether the earth's albedo would be substantially altered after a nuclear war and thus affect the radiation balance or whether the deposition of soot aerosol on arctic snow and ice and on the glaciers of the Northern Hemisphere might not lead to such heavy snow and ice melting as to cause an irreversible change in one or more important climatic parameters.

Krakatoa doesn't disprove nuclear winter – four reasons
Sagan in '84

(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, "The Cold and the Dark: The World After Nuclear War", p. 32)

DR. SAGAN: I very much hope that the new National Academy panel will address that important issue. Let me say very quickly the reason for the differences between our nuclear winter results and those of the 1975 Academy study.

First, the climatic effects were addressed by arguments from analogy with the Krakatoa volcanic explosion, not from any attempt actually to model the effects. In 1883, it was argued, a volcano went off that had as its only global effects a temperature decline of a half a degree or so, and pretty sunsets all over the world. The total explosive energy in that event was (perhaps) comparable to the total yield we are talking about in a nuclear war; so why worry?

That argument neglects several facts: First, the vast bulk of the material ejected in the Krakatoa explosion fell right there in the Sunda Straights. Second, volcanic ejecta, mainly silicates and sulfuric acid, have very much lower absorption coefficients than the dark smoke generated by nuclear war. Third, particle size distribution functions are different and, fourth, we are talking about thousands of simultaneous sources of fine particles. Krakatoa was a single event. There are other significant differences as well. Fold all that in, and the Krakatoa event is consistent with the calculations reported here.

Volcano smoke is not as effective at blocking light than nuclear weapon aerosols
Schneider in '84

(Stephen, Deputy Director of the Advanced Study Program at the National Center for Atmospheric Research, "The Cold and the Dark: The World After Nuclear War", p. 102)

DR. SCHNEIDER: I would like to comment on that. The postnuclear-war situation would not, I suspect, be analogous to Mount St. Helens.

The properties of these nuclear smoke aerosols, as best we can understand, are such that infrared opacity is an order of magnitude less than the visible opacity. For an optical depth of around 3 to 5 in the visible spectrum, the infrared optical depth is less than 1. Therefore the sunlight is blocked out at high altitudes, and the surface still cools by radiation of infrared energy through the smoke layer to space. This results in a developing inversion, and is the reason for the cooling of the surface.

If in fact there were ten times as much smoke, then you might be able to prevent a sharp surface cooling, because if the infrared opacity of the atmosphere is large enough, the atmosphere becomes almost isothermal, as in the case of the Mount St. Helens ash cloud. It is ironic that, in the peculiar case of too much smoke, the surface cooling effect might disappear. (Later on, when some of the smoke settles out, the cooling would occur.) It is only when the visible opacity of smoke is in the range of 1 to 10 that the infrared opacity is so low that it really is not a major factor. At least, that is what the one-dimensional, radiative-convective models show.

A2: Nuclear Testing Disproves Nuclear Winter

Nuclear tests not simultaneous and not targeted to start fires
Holdren in '84

(John, Professor of Energy and Resources and Acting Chairman of the Energy and Resources Group at UC Berkeley, "The Cold and the Dark: The World After Nuclear War", p.104-105)

DR. MARTIN H. EDWARDS (Head, Physics Department, Royal Military College of Canada; former President, Canadian Nature Federation): Those who do not want to believe the results of these studies will look for what they hope will be a single fatal flaw in the argument, and I am confident that they will point to the fact that there have been many thousands of tests of nuclear weapons. There have been even single tests with as much as 58 megatons in the past, and no catastrophic climatic effects have occurred. I think that one must address the flaw in that potential criticism, and I would ask the panel to do so.
DR. JOHN HOLDREN: As several people mentioned yesterday, the tests that have been conducted, although they add up to a fairly impressive megatonnage, nevertheless represent isolated events and were carried out entirely under circumstances that would not ignite large fires. One of the key points that must be emphasized again and again is the primary source of difference between the calculations presented at this Conference and previous calculations. The new calculations take into account the very large-scale fires, and the large production of soot which, of course, did not occur under the circumstances of any of the nuclear tests but would occur under a very wide range of circumstances in an actual nuclear war.

Nuclear explosions in the 1950s don't disprove our conclusion – cities wasn't targeted
Sagan in '84

(Carl, David Duncan Professor of Astronomy and Space Sciences at Cornell, "The Cold and the Dark: The World After Nuclear War", p. 37-38)

DR. FRANCIS B. PORZEL (Foundation for Unified Dynamics): I cannot pass up the opportunity to tell you that it has been almost to the hour thirty-one years since the first hydrogen bomb was fired.
I think it would help the report a great deal if you could relate to past experiences, to the atomic tests. Looking at the graphs, I note there were several periods during the fifties when the Soviet Union and the United States held test operations which were approaching the 100-megaton range in total; Bravo alone was 14 megatons for the first one in 1954.
You mentioned that the model was one-dimensional so it would not be applicable to this. But would you care to comment on what would be the caution that you would have to exercise with your model if one attempted to apply it to that experience?
DR. SAGAN: Put another way, what does the model predict for the atmospheric nuclear weapons explosions in the fifties? And the answer is it predicts no detectable effect. The reason is, remember, that the 100 megatons has to be dedicated to igniting about 100 city fires. That is not what you did. You had dust but no soot. The easiest way to describe this is through the concept of optical depth. The transmitted light through a pure absorbing overcast is roughly e, the base of natural logarithms, to the power minus optical depth. When the optical depth is around a tenth, the attenuation is one minus optical depth. It is very small.
When the optical depth gets up to 1, which you were never near in the fifties, then the attenuation becomes significant. And when the optical depth is around 10 the attenuation becomes severe. Because this is a nonlinear process, what happened in the fifties, we predict, should have no climatic effects and none were observed. But what is happening in our calculations is an optical depth of many. The consequent effects will be significant.

Extensions: Nuclear War Collapses Environment

Nuclear war escalates and destroys the environment, ultimately causing extinction
Leaning, 1991 (Jennifer, Editor in Chief, PRS Quarterly: A Journal of Medicine and Global Survival, "A Venture and a New Beginning", Volume 1, Issue 1, March, http://www.ippnw.org/MGS/PSRQV1N1LeaningEd.html)

<There are three key elements to this consensus. Nuclear war, once begun, whether by accident or intent, would not remain "limited." The imponderables of command and control and the inextricably linked escalation strategies would entrain many countries after the first use of nuclear weapons. Second, nuclear war cannot be described solely in terms of short-term effects deriving from the physics of the weapons themselves. Because it would destroy our biological networks and social relationships, nuclear war would inflict thorough and extensive devastation on all aspects of world existence for a very long time. Third, nuclear war cannot be understood in conventional terms. It is neither a disaster we have seen, nor a war we have fought. Unlike previous disasters, nuclear war, in its instantaneousness and totality, wipes out the potential for outside response and social recovery. Past wars have been fought with the rational objective of winning. The notion of winning included, as a minimum, the notion of surviving. After nuclear war, neither notion has much reality.>

Nuclear war collapses ecosystems including genetic diversity
Roberts in '84
(Walter, Creator of the High Altitude Observatory at Climax Colorado and Professor of Astro-Geophysics at University of Colorado, "The Cold and the Dark: The World After Nuclear War", p. 159)

Ehrlich points out that "all human systems are embedded in ecosystems and are utterly dependent upon them for agricultural production and an array of other free `public services.' These services include regulating climates and maintaining the gaseous composition of the atmosphere; delivering fresh water; disposing of wastes; recycling of nutrients (including those essential to agriculture and forestry); generating and preserving soils; controlling the vast majority of potential pests of crops and carriers of human disease; supplying food from the sea; and maintaining a vast genetic `library' from which humanity has already withdrawn the very basis of civilization—including all crop plants and domestic animals." And he points out that a nuclear war will curtail these free services from nature at a time when people will need them even more.

Nuclear war causes massive ecosystem collapse risking all life on earth
Israel in '84
(Yuri, Corresponding Member of the USSRA Academy of Sciences and Chairman of the State Committee for Hydrometeorology and the Control of the Environment, "The Cold and the Dark: The World After Nuclear War", p. 140)

From all that I have said, it should be clear that nuclear explosions, particularly on a massive scale, will lead not only to very destructive consequences locally, but also to destruction and changes on a global scale. They will lead to irreversible changes in the climate and the destruction of much of the ozone layer of the Earth and will jeopardize the ecosystems of the Earth. Moreover, the effects will be synergistic. The ecological effects can lead eventually to a greater number of deaths and victims than the direct, immediate effects, and this applies both to those who are directly involved in a war and to those who are indirectly involved in the war, even a so-called limited nuclear war. This underscores the fact that in a nuclear war there can be no victor and no vanquished. In the final analysis all sides suffer fatally; Dr. Sagan has already spoken of this. Thus we are raising the question of the very existence of life on Earth.

Nuclear war destroys all natural cycles necessary for ecosystem survival
Harte in '84
(John, Professor of Energy and Resources at UC Berkeley, "The Cold and the Dark: The World After Nuclear War", p. 111-112)

PANEL MEMBER DR. JOHN HARTE: All of us are as dependent on the ecosystems surrounding us as an intensive-care patient is on intravenous bottles and life-supporting medical equipment. Waging nu-clear war would be akin to throwing a lighted stick of dynamite into an intensive-care ward, rupturing the vital links that ensure survival. The essential life-sustaining services that normal, healthy, natural environments provide include the regulation of the hydrologic cycle so as to minimize the occurrence of extremes of drought and flood; this is exemplified by vegetated hillsides that slow down runoff and smooth out riverflow. Another such service is the amelioration of air and water pollution and treatment of solid wastes by natural atmospheric and microbial processes. A third is the moderation of our climate, again exemplified by the role of large stands of living vegetation,which can create a microclimate essential to their own existence.

In the first three to six months following nuclear war, these and other ecological services would virtually be shut down. The loss of a year's agricultural harvest is discussed by other speakers—I would like to describe several water-related issues and then make some general comments on the prospects for long-term restoration of dam-aged ecological services. 147

Extensions: Nuclear War Collapses Environment

Nuclear war dramatically accelerates ecosystem collapse by 50-100 years
Erlich in '84
(Paul, Professor of Biological Sciences at Stanford, "The Cold and the Dark: The World After Nuclear War", p. 63)

MR. WARD MOREHOUSE (President, Council on International and Public Affairs, Inc.): Even in a world without nuclear war, many biologists, I am told, are concerned about the accelerating and apparently irreparable loss of the world's stock of genetic material. What would be the likely impact on that stock of genetic material in the event of a nuclear war, how much of it would be irreparably lost, and what impact would this have on the capacity of agricultural ecosystems to regenerate themselves?
DR. EHRLICH: In our opinion, a great deal of the genetic diversity in crops would be lost, obviously, because of the loss of seed stocks, and also, if events spread to the tropics, an enormous loss of diversity in general. But I think it would be fair to say that many —although I am speaking for myself in this case—view a nuclear war as basically doing something in perhaps an hour and a half what Homo sapiens seem to be en route to doing now in somewhere between 50 and 150 years. What nuclear war does on all of these fronts is condense the action into a very much shorter period.

Nuclear war would cause cold air to collapse tropical ecosystems crushing key genetic diversity
Erlich in '84
(Paul, Professor of Biological Sciences at Stanford, "The Cold and the Dark: The World After Nuclear War", p. 56-57)

Many plants in tropical and subtropical regions do not possess dormancy mechanisms enabling them to tolerate cold seasons. In those regions, large-scale injury to plants would be caused by chilling, even if temperatures did not fall all the way to freezing. In addition, vast areas of tropical vegetation are considered to be very near the photosynthetic `compensation point"—their uptake of carbon dioxide is only slightly more than that given off. If light levels dropped, those plants would begin to waste away—even in the absence of cooling. If light remained low for a long time, or if low light levels were combined with low temperature, tropical forests could largely disappear, taking with them most of one of Earth's most precious nonrenewable resources: its store of genetic diversity, including the majority of plant and animal species. Tropical animals, including human beings, are also much more likely to die of the cold than their temperate counterparts. In short, where tropical regions are affected by climatic changes, the consequences could be even more severe than those caused by a similar change in a temperate zone.

Extensions: Nuclear War Collapses Environment ➔ Extinction

Ecosystem collapse makes human extinction likely after a nuclear war
Harte in '84
(John, Professor of Energy and Resources at UC Berkeley, "The Cold and the Dark: The World After Nuclear War", p. 113)

Years after the war, the life-sustaining capacity of the terrestrial environment would still be greatly reduced, even though light levels and temperatures would be close to pre-war conditions. The favorability of local climate, the arability of soil, the constancy and quality of water supply, and the availability of gene resources would be severely degraded by the months of extreme conditions following the war. Massive areas of vegetation killed by fire or darkness would result in altered local climatic and soil conditions that are overwhelmingly unlikely to be favorable to replanting. With many of their natural enemies killed, insect pests would frustrate attempts at new crops, as would soil erosion from bare, exposed land. Ultraviolet radiation would probably persist as an ecological stress well beyond the first year.
Would the few remaining survivors be able to reestablish those vital links to the life-sustaining ecosystems needed to ensure survival? Reestablishing those links would occur only after ecosystems recover, and only if the remnants of society could summon the requisite social organization and technology needed to exploit the restored ecosystems. The time required for the latter to occur is difficult to estimate, but it would certainly be at least as long as for the former, because without ecosystems to provide the basic necessities of life, a highly organized technological society is impossible. The restoration of devastated ecosystems is likely to take at least a decade —an estimate based on the experience of ecologists with data on historical examples of greatly debilitated ecosystems. Because of this delayed restoration, the small surviving human population would be likely to shrink further, thus increasing its chances of going extinct altogether.

Human extinction can't be ruled out – even if direct effects don't kill everyone indirect effects and degradation of the environment render human extinction possible
Erlich in '84
(Paul, Professor of Biological Sciences at Stanford, "The Cold and the Dark: The World After Nuclear War", p. 58-59)

Now, the biologists have had to consider the possibility of the spread of darkness and cold over the entire planet and throughout the Southern Hemisphere. It still seemed unlikely to them that that would immediately result in the deaths of all the people in the Southern Hemisphere. We would assume that on islands, for instance, far from sources of radioactivity and where the temperatures would be mode-rated by the oceans, some people would survive. Indeed, there probably would be survivors scattered throughout the Southern Hemisphere and, perhaps, even in a few places in the Northern Hemisphere.
But one has to ask about the long-term persistence of these small groups of people, or of isolated individuals. Human beings are very social animals. They are very dependent upon the social structures that they have built. They are going to face a very highly modified environment, one not only strange to them but also in some ways much more malign than people have ever faced before. The survivors will be back in a kind of hunter and gatherer stage. But hunters and gatherers in the past have always had an enormous cultural knowledge of their environments; they knew how to live off the land. But after a nuclear holocaust, people without that kind of cultural back-ground will suddenly be trying to live in an environment that has never been experienced by people anywhere. In all likelihood, they will face a completely novel environment, unprecedented weather, and high levels of radiation. If the groups are very small, there is a possibility of inbreeding. And, of course, social and economic systems and value systems will be utterly shattered. The psychological state of the survivors is difficult to imagine.
It was the consensus of our group that, under those conditions, we could not exclude the possibility that the scattered survivors simply would not be able to rebuild their populations, that they would, over a period of decades or even centuries, fade away. In other words, we could not exclude the possibility of a full-scale nuclear war entraining the extinction of Homo sapiens.

Extensions: Nuclear War ➔ Epidemics

Radioactivity would weaken the immune system wiping out survivors from disease
Kuzin in '84
(Alexander, Corresponding Member of the USSR Academy of Sciences, "The Cold and the Dark: The World After Nuclear War", p. 150-151)

DR. ALEXANDER KUZIN (Corresponding Member of the USSR Academy of Sciences): As a radiobiologist, I would like to draw your attention to another problem. If a nuclear catastrophe should arise, then of course there will be a very serious global, planet-wide fallout of radionuclides and a rise in the background level of radiation. As a radiobiologist, I know how different various species are with regard to sensitivity to radiation. Man is one of the most sensitive species. The increased exposure to radiation will bring about many changes; the immune system of man will be destroyed. At the same time, pathogenic microorganisms which we usually regard as pests, are very immune to this kind of radioactivity. Therefore, another ecological imbalance will arise, which will contribute to the dying out of the small population of humans that will have survived the immediate consequences of a nuclear catastrophe.
It is thus a direct responsibility of scientists in the Soviet Union and in the United States to make known to all people what great dangers would be posed by the starting of any kind of a nuclear conflict, in order to preclude the very possibility of a nuclear war which undoubtedly would result in not just the dying out of the present civilization, but the threatening of life as such on this beloved planet of ours.

Nuclear war leads to disease epidemics
Harwell in '84
(Mark, Associate Director of the Ecosystems Research Center and Associate Professor at the Natural Resources Department of Cornell, "The Cold and the Dark: The World After Nuclear War", p. 123-124)

The medical systems would also dissipate, as elaborated by the Physicians for Social Responsibility, and little if any effective care would remain for the millions of injured. As time progressed, major outbreaks of contagious diseases would kill millions, especially in early stages after the nuclear war, when people would group into shelters for protection from weather, radiation, and bands of other humans, at a time when sanitary facilities and uncontaminated water would essentially disappear. Consequently, enteric diseases especially would occur. Later, epidemics and pandemics from pest-vectored diseases, such as rabies and the plague, would be widespread.

A2: Fallout Shelters Make Nuclear War Survivable

Fallout shelters are tombs-they offer no hope of survival
Freeman, 1985
(Harold, Prof. Emeritus MIT, If You Give a Damn About Life, pg. 25-7)

In a nuclear war, occupants of family shelters will die in assorted ways: by crushing if the shelter is vulnerable to bomb blast; by incineration if the shelter is reached by the firestorm (at five miles from burst, shelter temperature could reach 1,500 degrees Fahrenheit); by asphyxiation if the firestorm absorbs all available oxygen; by starvation or dehydration in the likely absence of radiation-free food or water; or by initial radiation if the air within the shelter cannot be continuously filtered.
MIT physicists estimate that appearance outside a shelter for more than three minutes will produce fatal third-degree burns from intense ultraviolet light; this is the consequence of ozone layer depletion.
For those at a greater distance from burst, protection in a family shelter could provide a small improvement in chances for survival. But it will be small indeed. Living mostly in darkness, unable to communicate with others attempting to survive, with radiation gradually penetrating the shelter, occupants might gain several extra weeks or even months of what could arguably be called life. Lacking means, they will not be able to determine the level of radioactive contamination of stored food; one choice will be between hunger and radiation sickness. Toilet refuse and vomit form those gradually being afflicted with some degree of radiation sickness will add extra stench to the stale air of the shelter. Any early exposure to radiation will have weakened or destroyed the immune system; even minor infections will take hold and bring death. Any injuries or burns of those who were late reaching the shelter will be far beyond the range of any first-aid kit. With five or more people in the space of a bathroom, emotion eruption, alternating with the demoralization and apathy, is virtually guaranteed. At best, many occupants of family shelters will find themselves alive in what will turn out, in short time, to be their coffins. The delay will be shorter for children

didn't think we had cards on that did you?

A2: Some Countries Wouldn't Be Effected

Nuclear war would cause nuclear winter and massive starvation even in countries not involved
UPI, 1985 (Eliot Brenner, "Nuclear winter: 'Elaborate way to commit national suicide'" Oct. 3, lexis)

<A nuclear war hitting 100 cities could create a "nuclear winter" effect in which billions might die of mass starvation, astronomer Carl Sagan said Thursday.
Sagan told the Senate Armed Services Committee the nuclear winter effect of lowered temperatures, less sunlight and crop failures might deter a first strike because it would be "an elaborate way to commit national suicide."
Assistant Defense Secretary Richard Perle, who also testified before the panel, conceded it was "almost certain that a nuclear winter would result from a very large-scale nuclear war." But he said there was "tremendous uncertainty" at what point the threshold between no effect on the atmosphere and a nuclear winter is crossed.
The hearing was the second of two called by Chairman Barry Goldwater, R-Ariz., to explore the issue before his influential panel.
Sagan noted previous testimony to the panel said that "massive global starvation is a very likely consequence" of a widespread war that would drive down global temperatures because of smoke thrown into the atmosphere.
He said the loss of crops means that "people in other countries ... are now fundamentally threatened even if no nuclear weapons fall on them."
Sagan told the panel that 100 cities is certainly sufficient to create a nuclear winter and it may well be that far fewer are necessary to cause the effect.>

A2: Damage Limitation

Damage limitation is impossible-nuclear winter leads to massive destruction
Damrosch, 1986 (Lori Fisler, Associate Professor of Law, Columbia University, Columbia Law Review, April, 86 Colum. L. Rev. 653)

We can all agree with the contributors to this volume that nuclear weapons present the threat of unimaginable devastation that could bring an end to civilization and even to life on this planet. The grim calculations and stark images come back again and again, but they cannot be repeated too often: over 50,000 weapons in the United States and Soviet arsenals, each with a destructive force dwarfing the explosions at Hiroshima and Nagasaki; radiation effects producing indescribable suffering and death; environmental damage that defies quantification or prediction; the specter of nuclear winter rendering the earth uninhabitable. No rational being can ponder this threat and be indifferent to the urgency of seeking ways to end it. In this spirit, Nuclear Weapons and Law challenges the legal profession to bring all its talents and tools to bear in the struggle against the nuclear menace.

A2: Martin (Nuclear War Impacts Overstated)

Martin uses shoddy over-generalizations – he ignores the implications of the mere risk of nuclear extinction
Pittock in '84
(A. Barrie, Leading Atmospheric Researcher and Winner of the Australian Public Service Medal for Climate Research, SANA Update, "Comment on Brian Martin's "Extinction politics"", Number 20, September, http://www.uow.edu.au/arts/sts/bmartin/pubs/84sanap.pdf)

It is unfortunate that Brian Martin, in SANA Update (May 1984) and elsewhere, uses such emotive terms as "extinction politics" and "doomsday beliefs", which display a lack of respect for, and a tendency to make categorical generalizations about, many and varied statements and positions about the effects of nuclear war held by sincere and thoughtful people.
It is ironic that Brian notes disapprovingly that "By the 1950's, a large number of people had come to believe that the killing of much or all of the world's population would result from global nuclear war", when in point of fact it was in the mid-50's that the combined arsenals of the superpowers probably did reach the level at which they were for the first time capable of causing a global climatic disaster (Sagan, 1983). It is arrogant of scientists to dismiss people's gut feelings when scientists themselves were then, and may well still be, largely ignorant of the effects. In the face of scientific ignorance "common sense" is often a good guide.
Brian quotes Nevil Shute's novel On the Beach as if it had no shred of scientific basis, completely ignoring the explicit scenario which Shute drew up in which large numbers of nuclear weapons coated with cobalt were exploded with the deliberate intention of increasing nuclear fallout. Again, it is ironic that a recent study conducted at the Lawrence Livermore National Laboratory (Knox, 1983) shows that fallout estimates for a major nuclear war have been under-estimated by about a factor of five hitherto, and that attacks on nuclear power stations and fuel cycle installations could increase long-term fallout by another factor of ten or so.
Next Brian attacks Jonathan Schell for discussing the implications of human extinction in The Fate of the Earth. Brian never acknowledges that Schell quite explicitly said that human extinction is not a certainty (see Schell p. 93), and ignores the powerful arguments which Schell advances for regarding the mere possibility of human extinction as important. These are developed further in Schell's more recent articles in The New Yorker (Jan. 2 & 9, 1984).

Martin is wrong about ozone depletion
Pittock in '84
(A. Barrie, Leading Atmospheric Researcher and Winner of the Australian Public Service Medal for Climate Research, SANA Update, "Comment on Brian Martin's "Extinction politics"", Number 20, September, http://www.uow.edu.au/arts/sts/bmartin/pubs/84sanap.pdf)

Brian then claims that the scientific basis of the ozone depletion problem has "almost entirely evaporated". In fact, while we now know that the nuclear winter effect is almost certainly far more serious than ozone depletion, the ozone depletion problem has not been dismissed except in so far as the trend to smaller warheads may limit the quantity of oxides of nitrogen injected into the stratosphere by the nuclear explosions themselves. Ozone depletion could in fact end up being more serious due to injections of combustion products, including smoke, into the stratosphere.

Martin has no warrant for mitigating effects of nuclear war – winter theory has withstood strict scrutiny
Pittock in '84
(A. Barrie, Leading Atmospheric Researcher and Winner of the Australian Public Service Medal for Climate Research, SANA Update, "Comment on Brian Martin's "Extinction politics"", Number 20, September, http://www.uow.edu.au/arts/sts/bmartin/pubs/84sanap.pdf)

Brian claims that the impact on populations nearer the Equator, such as in India, "does not seem likely to be significant". Quite to the contrary, smoke clouds are likely to spread into the tropics within a matter of weeks and would probably lead to below freezing temperatures for months on end. Populations and the ecology in such regions are the least able to withstand such a climatic onslaught and must be very seriously affected.
Then he says that major ecological destruction "remains speculative at present". Is he suggesting that a sudden and prolonged plunge to below freezing temperatures, with insufficient light for photosynthesis, might have little harmful effect, or is he denying the reality of "nuclear winter"?
There have been a number of specific criticisms of the various published papers on nuclear winter, but after more than two years in print there has been no criticism which has substantially altered the basic conclusions. The most prominent criticism has come from John Maddox, editor of Nature (307, 121: 1984), who completely failed to take account of the vital difference in optical properties of soot and volcanic dust (La Marche and Hirschboeck, 1984).
Principal uncertainties exist as to the war scenarios, the fraction of soot in the smoke, the height of injection of the smoke, the amount which would be removed by washout in the initial plumes, and the later rate of removal. In most cases the published papers made assumptions which tended to under-estimate the effects, especially with regard to the height of injection of the smoke and its lifetime. Two possible exceptions are the war scenarios, in which the so-called "baseline" case may be too large by a factor of 2, and perhaps the particle coagulation rates if the initial plumes are not rapidly dispersed. My judgement now is that the initial effects would be much as described in the published papers, even with a 2,000 megatonne war, except that the lifetime of the effects could well turn out to be years rather than months. I will discuss the technical details elsewhere.

A2: Limited Nuclear War – Won't Stay Limited – Miscommunication

Escalation control fails in nuclear war—Differences of view and miscommunication sparks inadvertent escalation
Krepon, author and President Emeritus of the Henry L. Stimson Center**, 2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

This kind of strategic analysis did not provide political leaders much comfort as to how escalation might be controlled up to and across the nuclear threshold. Will strategists and military planners in South Asia have more success in developing a plausible theory of, and military plans for, escalation control? Escalation control presumed mutual agreement between nuclear rivals to fight for limited stakes. As Brodie explained, "[T]he curtailing of our taste for unequivocal victory is one of the prices we pay to keep the physical violence, and thus the costs and penalties, from going beyond the level of the tolerable."5 Robert Osgood defined limited war as "part of a general 'strategy of conflict' in which adversaries would bargain with each other through the medium of graduated military responses, within the boundaries of contrived mutual restraints, in order to achieve a negotiated settlement short of mutual destruction."6 This assumed, of course, that both nuclear-armed adversaries were willing to play by the same general rules – a condition, as Osgood subsequently acknowledged, that did not apply during the Cold War. "One trouble with all strategies of local war in Europe," he wrote in 1979, "is that the Soviet Union has shown virtually no inclination to be a partner to them."7 While US strategists were constructing rungs along the escalation ladder, the Soviet General Staff was planning for a blitzkrieg across Europe. Another reason why US strategic thinkers failed to devise a plausible theory of escalation control during the Cold War was the inherent difficulties in communicating with an adversary whose differences of view and objectives were so great that they would result in conflict. If miscommunication with, or misreading of, an adversary lead to conflict, this would suggest that communication to keep that war limited might also fail – assuming that lines of communication remain intact. But, as Barry Posen has noted, "Inadvertent escalation may also result from the great difficulty of gathering and interpreting the most relevant information about a war in progress and using it to understand, control, and orchestrate the war."8

Communication would be impossible in nuclear war – limits would be impossible
Krepon, author and President Emeritus of the Henry L. Stimson Center, **2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

Another major deterrence theorist, Thomas Schelling, postulated hopefully that a process of "tacit bargaining" during limited war might point to a settlement because of the "intrinsic magnetism of particular outcomes, especially those that enjoy prominence, uniqueness, simplicity, precedent, or some rationale that makes them qualitatively differentiable from the continuum of possible alternatives."9 However, as Schelling himself acknowledged, since communication has presumably been limited prior to the conflict and would be quite strained during a limited war, there could be no assurance that tacit bargaining "will succeed in any particular case or that, when it succeeds, it will yield to either party a particularly favorable outcome."10

A2: Limited Nuclear War – Won't Stay Limited – Fog Of War

Limited nuclear wars inevitably escalate—the fog of war reduces influence of civilian authorities
Krepon, author and President Emeritus of the Henry L. Stimson Center, **2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

Western deterrence theory regarding limited war was deeply suspect because it presumed rational choices and effective command and control amidst the fog of war – especially the chaos of a radiated battlefield. Posen challenged these heroic assumptions, concluding that, "[T]he fog of war increases the likelihood of inadvertent escalation because misperceptions, misunderstandings, poor communications, and unauthorized or unrestrained offensive operations could reduce the ability of civilian authorities to influence the course of the war."11 Another outstanding thinker on this subject, Morton Halperin, wrote that graduated escalation could "continue until both sides decide that it is not in their interest to expand the war." However, Halperin himself acknowledged that, while …both sides may desire to avoid the economic cost of employing greater military power, there is no reason to believe that only the losing side might expand the war. The winning side might alter its war termination conditions in ways which require an expansion of the war… The necessary condition for the stabilization of local war is agreement with the decision system of each side – and not agreement between the two sides – that further expansion is undesirable.12
This keen insight further erodes the foundations of limited war theory, since it requires adversaries not only to draw proper conclusions from each other's moves on the battlefield, but also to understand the dynamics of bureaucratic politics in enemy territory, and correctly predict the outcome of internal debates. To make matters even worse, Schelling and Halperin acknowledged that, "Accidental occurrences of various kinds are also more likely during a limited war."13 Unfortunately, accidents only lend themselves to rational analysis well after the fact.

Information inaccuracies, time pressures, and extremist attacks destroy attempts to control nuclear escalation
Krepon, author and President Emeritus of the Henry L. Stimson Center, **2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

Escalation control does not become simpler when nuclear rivals acquire and deploy more diverse nuclear war-fighting capabilities – especially when they maintain portions of these forces on "hair-trigger" alert. While prospects for escalation control are improved by refraining from these Cold War-era practices, they are far from assured. In South Asia, the nuclear rivalry is still at a relatively early stage, where the balance of forces is opaque and new technologies are being fielded. Crises have been occurring with some frequency, during which readiness rates for nuclear-capable forces have apparently been increased. Signaling during crises has been confusing, and intelligence assessments have been found wanting.18 Under these circumstances, how can escalation control be assured, particularly when one adds to this mix the possibility of a nuclear accident or a catalytic incident by an extremist group during a crisis? If under these tense circumstances, a nuclear "event" were to occur, escalation control would be challenging, to say the least. Much would depend upon the nature of the event, as best this can be determined. Where did the event actually occur? What kind of radioactive material was released and by which means? Was it an accident, an act of nuclear terrorism, sabotage, or an act of war? Did the event produce a mushroom cloud? Much would also depend on the prior political context and the location in which the event occurred. Were bilateral relations improving or deteriorating before the crisis? Were the armed forces of both countries present at the site of the event? Were there clashes? Were jihadi or counter-insurgency operations underway at the site of the event?19 Obtaining solid information and correct answers to these questions might take time, and national leaders may not have much time to deliberate. If the nuclear event produced a mushroom cloud, decision-making would be severely compressed. Escalation control under these circumstances would be no easier than in a case where nuclear rivals possess very large arsenals.

Limited nuclear war is impossible—Fog of war, lack of intelligence, and attacks on population centers cause escalation
Salik, Security and Defense analyst in the Arms Control and Disarmament Affairs Directorate, **2004** (Brig. Naeem Ahmad, "Perils of 'Limited War' in a Nuclear Environment," http://www.issi.org.pk/journal/2004_files/no_4/article/1a.htm)

Dangers of 'Limited Nuclear War'The risks involved in a 'limited nuclear war' are of far greater proportions as compared to its conventional version and, therefore, is even more undesirable as compared to limited conventional war. This is mainly due to the tremendous destructive potential of even a limited number of nuclear weapons, even of a less potent variety, and the universal risk of vast collateral damage in case of any use of nuclear weapons in a supposed 'limited war'. Another very serious practical problem is based on the reality that any decision to use nuclear weapons would have to be taken in the midst of ongoing conventional operations in an environment where, due to the fog of war, accurate and timely intelligence about the adversary would be a rare commodity and the stressful conditions which the decision makers would already be enduring would make any rational decision-making even more difficult. Kissinger has drawn attention to another dichotomy in the thinking about 'limited nuclear war' saying that, 'as long as nuclear war is considered by analogy to conventional war, strategy will be stymied by the incommensurability between the power of the new weapons and the rigidity of traditional tactics'30 Another difficulty in the concept of 'limited nuclear war' is the fact that large population centres continue to remain the most attractive targets for a nuclear strike. It is not hard to fathom that besides the material destruction caused by such strikes they would also cause very serious scars on the psyche of the decision makers, with the result that their responses will be driven more by emotions rather than rational cost-benefit calculations. Kissinger, however, believes that, the threat of 'limited nuclear war' is more credible in terms of its impact on the credibility of deterrence as

didn't think we had cards on that did you?

opposed to conventional war. This would obviously entail the possession of a wider variety of nuclear weapons to compound the aggressor's risk-gain analysis. Whether a 'limited war' nuclear or otherwise may remain limited would depend on the working out of a subtle equation between the willingness of the contenders to assume risks and their ability to increase their commitments.31

A2: Limited Nuclear War – Won't Stay Limited – Miscalculation

Limited war theories are false—Miscalculations and incautious policies make escalation inevitable
Salik, Security and Defense analyst in the Arms Control and Disarmament Affairs Directorate**, 2004** (Brig. Naeem Ahmad, "Perils of 'Limited War' in a Nuclear Environment," http://www.issi.org.pk/journal/2004_files/no_4/article/1a.htm)

Thomas Schelling advocated a 'strategy of coercive diplomacy' with a whole menu of actions ranging from 'diplomatic protest and warning' through 'demonstration of force', to engagement of a group of targets valued by the adversary and piling on more and more destruction until the enemy would realise that the cost of aggression would outweigh the benefits likely to accrue from persisting with the offensive action.8 According to Brown, the idea of 'coercive diplomacy' was attractive for the decision makers in view of the fact that, as shown by the events in Korea leading up to MacArthur's dismissal, military forces had an inherent tendency to cause unintended escalation. Therefore, carefully calibrated pressure, signalling and tight control afforded by coercive diplomacy was an ideal way to manage conflict in the nuclear age. He goes on to explain that:
'Limited war' theory had been built on the assumption that the opponent was cautious and value maximising, not a fanatically determined individual who will battle on until the weapons are dashed from his hands.' 9
In essence the whole concept of 'limited war' is built around two cardinal principles namely the 'minimum necessary' and 'the maximum feasible.'10 However, it is easier said than done and in practical situations it is difficult to precisely determine either of the two and any miscalculation on this account would lead not only to undesirable actions but to unintended consequences. In Henry Kissinger's view, with modern weapons a 'limited war' becomes an act of policy, not of necessity. He proceeds from there to define two variants of limited war. It may either be a war confined to a defined geographic area, or a war that does not utilise the entire available weapon systems (such as refraining from the use of thermonuclear weapons), or it may be a war which utilises the entire weapons system but limits its employment to specific targets. Between the Treaty of Westphalia and the French Revolution and between the Congress of Vienna and the outbreak of the First World War, wars were limited because of the existence of a political framework, which led to a general acceptance of a policy of limited risks.11 As has been aptly observed: 'The danger that limited wars may develop explosively into total wars leads one to consider whether the net effect of readiness to adopt 'limited war' strategies is to increase the probability of total war.'12

Limited nuclear wars inevitably escalate because of miscalculations and inaccuracies made by leaders
Salik, Security and Defense analyst in the Arms Control and Disarmament Affairs Directorate**, 2004** (Brig. Naeem Ahmad, "Perils of 'Limited War' in a Nuclear Environment," http://www.issi.org.pk/journal/2004_files/no_4/article/1a.htm)

'Limited War' can be criticised on many counts. The fundamental problem is that while a war may be planned as a 'limited war' it is difficult to guarantee that it would remain limited once it is executed. As Clausewitz rightly pointed out all war plans are only good enough till the first bullet is fired, then the fog of war and friction takes over. Moreover, once the battle is joined the events it generates acquire a momentum of their own and, above all, one cannot realistically predict with any degree of accuracy the intensity and persistence of the likely responses of the adversary. The chances of events spinning out of control and escalating to a level beyond the 'limited war' cannot be ruled out. Many analysts are, therefore, critical of the concept especially in a mutual nuclear deterrent environment. In the words of Professor John Garnett, 'it takes two to play a game and if one side neither acknowledges nor approves of the rules, then the game is out of the question; He forwards some key arguments militating against the concept of 'limited war' as follows:
'…that ideas of 'limited war' are dangerous because they undermine rather than complement the strategy of deterrence.
…that such ideas brought war back into the realm of political practicability.
…that the whole body of reasoning implied a level of rationality on the part of decision takers that was quite unrealistic and a degree of control over the battlefield that was technically impossible.'26
Lawrence Freedman is of the view that, 'no operational nuclear strategy has yet been devised that does not carry an enormous risk of degenerating into a bloody contest of resolve, or a furious exchange of devastating and crippling blows against the political and economic centres of the industrialised world.'27
The biggest paradox of 'limited war' is that the escalation it is intended to avoid may become a necessary requirement for its termination. Garnett has summed up the views of many Western strategists who point out that: '…military force is a blunt, crude instrument, better compared with the wood cutter's axe than the surgeon's scalpel. Inevitably, therefore, war is not usually a nicely calculated, precisely controlled business. More frequently it is a bloody, messy, painful and savage affair, which because it inflames the passions, provides an emotionally charged environment in which miscalculations and misperceptions flourish. The theory of controlled escalation ignores the crudity of the military instrument and seriously underplays the psychological pressure on each belligerent to misread his enemy's moves and to misjudge his own.'28
While discussing the problems of 'limited war', Kissinger has highlighted its complexities and is of the view that it poses much greater psychological problems as compared to an all-out war. He goes on to argue that, 'since limited wars offer no inherent guarantee against their expansion, they may gradually merge into an all-out war'29

A2: Limited Nuclear War – Won't Stay Limited – Nuclear Dominance

Desires for nuclear dominance undermine escalation control and fighting restraint
Krepon, author and President Emeritus of the Henry L. Stimson Center, **2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

Yet another reason why US deterrence theorists and military strategists failed to produce a plausible theory of limited war was because they usually were far more interested in escalation dominance. In their view, fielding dominant war-fighting capabilities was the preferred way to deter and dissuade an adversary from doing unfortunate things. And if deterrence and dissuasion failed, dominant war-fighting capabilities could be useful to influence outcomes in limited war. After all, how could one hope to convince an adversary to forgo escalation if not from a position of dominance? Possessing dominant nuclear war-fighting capabilities would also come in handy for an all-out war, where some semblance of victory required destroying as many opposing nuclear forces as possible before they destroyed you. In the anodyne terminology of deterrence theory and war planning, this targeting objective was known as "damage limitation." Greater "flexibility" with respect to nuclear targeting was but one of the instruments associated with this dogged pursuit.
Fortunately, these calculations of nuclear weapon strategists were not tested. Instead, the arms race became a surrogate for actual warfare during the Cold War. As a result, the jockeying for advantage – and the impulse to avoid disadvantage – was ceaseless. Targeting for victory – or at least relative advantage at war's end – required destroying the adversary's command and control nodes before yours were severely damaged. But striking these priority targets also meant damaging prospects for escalation control. As offensive nuclear capabilities grew, and as strategic defenses continued to face confounding technical challenges, western theories of escalation control appeared increasingly divorced from reality. Since neither superpower was willing to accept the other's quest for nuclear advantage and both sought to somehow escape from the straitjacket of mutual deterrence, stockpiles and deployed forces reached dizzying heights.14 As opposing nuclear capabilities grew, the disconnect between plans for escalation dominance and hopes for escalation control widened. So, too, did the distance between nuclear war planners and political leaders who bore the burdens of deciding when to press the nuclear button. The deeper western deterrence theorists delved into the subject matter, the more they clarified dilemmas rather than solutions. Limited war theory needed to be kept at arm's length by political leaders in the United States and Soviet Union, who understood intuitively that nuclear detonations didn't solve anything.

A2: Limited Nuclear War – Won't Stay Limited – Irrational Responses

Retaliation and irrational responses ensure that a limited nuclear war is impossible
Katz and Osdoby, 1982
(Arthur and Sima R., graduate student in the Department of Political Science, Johns Hopkins University, The Social and economic effects of nuclear war, April 21, http://www.cato.org/pubs/pas/pa009.html)

<What is more, the concept of "limited" nuclear war is illusory and thus dangerous. It propagates a notion that no Soviet and no U.S. planner should be encouraged to accept as a basis for policy-making -- that is, that damage from a military attack would be benign or "acceptable." As we have shown, damage to the fabric of civilian society from any effective attack against ICBMs and/or substantial numbers of military targets would create an imperative to retaliate and escalate. Thus the possibility of a controlled, rational "limited" nuclear war would be undermined. The perception of threat and vulnerability generated by this damage would eliminate the political option of control. Moreover, a number of commentators have raised the serious possibility that in a technical sense, the command and control structure would be so physically vulnerable that even purely mechanical communication requirements for controlling a nuclear response will not be available.[25] The combination of these two elements makes the viability of a "limited" nuclear war strategy highly doubtful.

Nuclear war can't be contained—DOD analyses prove that tension and disorganization make escalation inevitable
Sagan, Former Professor of Astronomy at Harvard University, **1985,** (Carl, "The Nuclear Winter," http://www.cooperativeindividualism.org/sagan_nuclear_winter.html)

Except for fools and madmen, everyone knows that nuclear war would he an unprecedented human catastrophe. A more or less typical strategic warhead has a yield of 2 megatons, the explosive equivalent of 2 million tons of TNT. But 2 million tons of TNT is about the same as all the bombs exploded in World War II -- a single bomb with the explosive power of the entire Second World War but compressed into a few seconds of time and an area 30 or 40 miles across … In a 2-megaton explosion over a fairly large city, buildings would be vaporized, people reduced to atoms and shadows, outlying structures blown down like matchsticks and raging fires ignited. And if the bomb were exploded on the ground, an enormous crater, like those that can be seen through a telescope on the surface of the Moon, would be all that remained where midtown once had been. There are now more than 50,000 nuclear weapons, more than 13,000 megatons of yield, deployed in the arsenals of the United States and the Soviet Union -- enough to obliterate a million Hiroshimas.
But there are fewer than 3000 cities on the Earth with populations of 100,000 or more. You cannot find anything like a million Hiroshimas to obliterate. Prime military and industrial targets that are far from cities are comparatively rare. Thus, there are vastly more nuclear weapons than are needed for any plausible deterrence of a potential adversary.
Nobody knows, of course, how many megatons would be exploded in a real nuclear war. There are some who think that a nuclear war can be "contained," bottled up before it runs away to involve much of the world's arsenals. But a number of detailed analyses, war games run by the U.S. Department of Defense, and official Soviet pronouncements all indicate that this containment may be too much to hope for: Once the bombs begin exploding, communications failures, disorganization, fear, the necessity of making in minutes decisions affecting the fates of millions, and the immense psychological burden of knowing that your own loved ones may already have been destroyed are likely to result in a nuclear paroxysm. Many investigations, including a number of studies for the U.S. government, envision the explosion of 5,000 to 10,000 megatons -- the detonation of tens of thousands of nuclear weapons that now sit quietly, inconspicuously, in missile silos, submarines and long-range bombers, faithful servants awaiting orders.

A2: Limited Nuclear War – Won't Stay Limited – Preparation ➔ Strike

Limited nuclear wars are impossible-any attempt at evacuation would be perceived as preparation for a nuclear strike, leading to escalation
Katz and Osdoby, 1982
(Arthur and Sima R., graduate student in the Department of Political Science, Johns Hopkins University, The Social and economic effects of nuclear war, April 21, http://www.cato.org/pubs/pas/pa009.html)

Finally, civil defense, particularly crisis relocation (evacuation), has been presented as a complementary element in nuclear strategy. It is ineffective at best. Its purpose is to minimize human destruction and thus purports to strengthen the basis for the possibility of successfully enduring a "limited" or even urban-oriented nuclear attack. This argument is tenuous. First, it is hard to believe that in a period of extreme tension, a full-scale urban evacuation by the U.S. or Soviet Union would be perceived as anything but a signal of intent to pursue a nuclear strike. Since an effective evacuation takes at a minimum four to five days to complete, certain actions are likely to be taken by the other side. Among the possibilities: a threat to attack if the evacuation is not stopped; an attack during the evacuation phase when the population is most exposed; and of course, the adoption of a strategy of "launch on warning," creating a hair trigger in a clearly dangerous situation. Ironically, a launch on warning would defeat the whole purpose of a first- strike strategy.
Even with a successful evacuation, destruction from a well-designed second strike against a major portion of urban economic and physical infrastructure (factories, housing, electricity generation, hospitals, etc.) would not necessarily leave a nation better off than no evacuation at all. A surviving population with no basic support systems is a prescription for human suffering, gross political instability, and eventually death on an incomprehensive scale. Even an evacuation without an attack would seriously damage the U.S. economy. And, as Fred Ikle succinctly put it, "The war will not end miraculously after the people have been moved into the nearest fields, and further problems of evacuation will then arise."[25]
Taken together, the concepts of "limited" nuclear war and crisis relocation represent a kind of sophisticated exercise in self-deception; a Pollyanna-like vision of the world that crumbles when confronted with dispassionate, realistic analysis of the limits of resiliency or flexibility of an society damaged by nuclear war.>

A2: Limited Nuclear War – Won't Stay Limited – International Alliances

International alliances make escalation inevitable-new proliferants will adopt launch-on-warning measures, increasing the number of detonations
Beres, 1974
(Louis Rene, Professor at Penn, Apocalypse, pg. 159-160)

Other political effects of a nuclear war between two countries would depend upon the nature of alignments in world politics, the reasons behind the war itself, and the reactions of unstable national leaders. The United Nations, too would be a likely casualty of such a nuclear war.,
If either one or both of the combatant countries had been party to a major alliance system, special tensions would develop throughout that system and within its opposite number. At a minimum, military forces of alliance countries would be placed on high-alert status, and a good deal of saber rattling could be expected. After a time, such saber rattling could have a self-fulfilling effect, bringing about the very conditions of extended nuclear conflict it was designed to prevent.
If it is generally believed that the two-country nuclear war had been initiated because the attacking party perceived vulnerability on the part of the victim's retaliatory forces, we could expect that other developing nuclear powers in the system would accelerate their construction of hair-trigger launch mechanisms and adoption of launch-on-warning measures. It follows that we could then expect an increased probability of additional strategic exchanges as a consequence of the accidental or unauthorized use of nuclear weapons.
All in all, the most important international political effect of a nuclear war between two countries would be a psychological one. With the actual use of nuclear weapons, states would become less inclined to think of such weapons as instruments of deterrence, and more inclined to think of them in orthodox military terms, as instruments of warfare. As a result of such changed orientations, what had once been in the realm of the "unthinkable" would now be entirely "thinkable," and national leaders would begin to take seriously the presumed advantages of striking first.>

A2: Limited Nuclear War – Won't Stay Limited – No Escalation Control

Limited war and single shot attacks fail—lead to counterattacks and escalation
Krepon, author and President Emeritus of the Henry L. Stimson Center**, 2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

In western deterrence literature, one means of escalation control is the option of a "demonstration shot." In this scenario, a singular nuclear detonation would signal an adversary to stop its conventional military advance. Morton Halperin characterized this scenario as follows: [O]ne side might use tactical nuclear weapons as a device to increase substantially the shared risk that the war would become central either by expansion or explosion. The country would be using tactical nuclear weapons not because of their likely influence on the battlefield but as a symbolic act, and would therefore be concerned to use them to demonstrate its own seriousness – to demonstrate the danger that the war might get out of hand – rather than to affect the outcome of the battlefield war. In this case the response of the enemy might well be on the same level, either a backing down on the basis of this demonstration of seriousness, or a corresponding use of tactical nuclear weapons in an effort to force the enemy to desist.20 In this scenario, the chastened adversaries halt matters before more mushroom clouds appear, perhaps with a significant assist from the international community. This scenario presumes that the first mushroom cloud since Nagasaki appears as a result of a considered leadership decision, and not due to a break down of command and control, an accident, or the pre-delegated use of a weapon by a beleaguered local commander. This scenario further presumes that neither adversary would seek to achieve an advantageous outcome in the event of a nuclear exchange; and that command and control arrangements would suffice to prevent unauthorized use after the first detonation. To lend credence to this scenario, the demonstration shot might occur in a remote area, without significant weapon effects. In a South Asian context, a demonstration shot might even occur on the territory of the beleaguered state.
Deterrence strategists during the Cold War needed to place a great deal of credence in rational decision making and the absence of unexpected events on the atomic battlefield; otherwise, the bottom would fall out of their analysis. Even under the most charitable assumptions, however, it was hard during the Cold War to place much credence in escalation control after a demonstration shot. Both adversaries had a surplus of weapons and targeting options, and opposing forces were so spring-loaded for attack that the deck was stacked against a singular nuclear detonation. If a national leader chose this option, or if it occurred because of a break down in command and control during an intense crisis, the likelihood of many more detonations was great. It was hard to envision that the political imperative of reciprocity, which shadowed most aspects of US-Soviet relations throughout the Cold War, would somehow not apply to a singular nuclear detonation. It was harder, still, to imagine that US and Soviet national security managers would seek to play for a tie in the event of a crossing of the nuclear threshold. Soviet nuclear doctrine envisioned massive, not singular strikes. "Limited" nuclear options came decades late to US nuclear war plans, and many of these options were "limited" only in comparison to the massive options that US nuclear forces were primed to deliver. The dictates of escalation dominance mandated raising the stakes, while the imperatives of damage limitation called for skipping rungs on the escalation ladder.

Flexible nuclear options like preemptive strike capabilities decrease escalation control
Krepon, author and President Emeritus of the Henry L. Stimson Center**, 2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

Throughout the Cold War, the pursuit of flexible nuclear options worked at cross-purposes with the objective of escalation control. Hawks presumed that the acquisition of superior nuclear war-fighting capabilities was necessary in order to leverage favorable outcomes and to convince an adversary that it was preferable to stop rather than to absorb even more nuclear detonations. Because an adversary might be unwilling to stop, nuclear war planners applied themselves to the task of placing all targets that could wreak terrible destruction
"at risk." The term for this in deterrence theory is "damage limitation." To succeed at damage limitation, the nation would require the means to carry out a massive preemptive strike as well as missile and civil defenses that could prevent or reduce the consequences of retaliatory blows.
As superpower nuclear arsenals grew more sophisticated, targeting options proliferated. Flexible nuclear options, however, did not provide much confidence that escalation could be controlled. As Jervis noted during a
particularly virulent phase of the nuclear competition, "Flexibility has become an end in itself and a substitute for the unattainable end of a strategy for terminating the war."32

Limited warfare fails—Military plans change during warfare and adversaries will disobey rules of restraint
Krepon, author and President Emeritus of the Henry L. Stimson Center, **2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

Despite the best efforts of theorists and analysts in the west and in South Asia, escalation is not easy to control. Optimistic plans for limited warfare assume that adversaries have grievances deep enough to fight over, and yet they will choose to fight by an agreed set of rules. We now know from studying war plans that this optimistic assumption was not valid during the Cold War. Nor does this assumption take into account the factor of unconventional warfare on the subcontinent. Another heroic assumption relates to battlefield management in the fog of war. It is a truism that the best-laid military plans need to be changed once a conventional war begins. What becomes of plans once the nuclear threshold is crossed? The essence of wisdom during the Cold War was an agreement not to change the territorial status quo by coercive or military means. The essence of wisdom as well as escalation control in South Asia lies in the avoidance of crises that leave much to chance. The cycle of escalation in South Asia, as Richard Sisson and Leo Rose have documented, begins long before conflict erupts, fed by poisonous statements, intelligence mistakes, misperceptions, violence through proxies, and coincidence.

Preventing this cycle from gaining traction is the best method of escalation control. As V.R. Raghavan has written, “Deterrence stability comes not through fears and anxieties but through reassurance.”36

A2: Limited Nuclear War – Won't Stay Limited – Use It Or Lose It

Limited nuclear war will quickly escalate—nuclear states will deploy entire arsenals so that others won't destroy them
Moore, political activist, speaker, and author, **2004** (Carol, "Six Escalation Scenarios Spiraling to World Nuclear War," http://www.carolmoore.net/nuclearwar/alternatescenarios.html)

A world nuclear war is one that involves most or all nuclear powers releasing a large proportion of their nuclear weapons at targets in nuclear, and perhaps non-nuclear, states. Such a war could be initiated accidentally, aggressively or pre-emptively and could continue and spread through these means or by retaliation by a party attacked by nuclear weapons. While some speak of "limited nuclear war," it is likely that any nuclear war will quickly escalate and spiral out of control because of the "use them or loose them" strategy. If you don't use all your nuclear weapons you are likely to have them destroyed by the enemy's nuclear weapons.
Such a war could start through a reaction to terrorist attacks, or through the need to protect against overwhelming military opposition, or through the use of small battle field tactical nuclear weapons meant to destroy hardened targets. It might quickly move on to the use of strategic nuclear weapons delivered by short-range or inter-continental missile or long-range bomber. These could deliver high altitude bursts whose electromagnetic pulse knocks out electrical circuits for hundreds of square miles. Or they could deliver nuclear bombs to destroys nuclear and/or non-nuclear military facilities, nuclear power plants, important industrial sites and cities. Or it could skip all those steps and start through the accidental or reckless use of strategic weapons.

Limited nuclear exchanges will spiral out of control—enemies will use weapons before they can be taken out
Moore, political activist, speaker, and author, **2004** (Carol, "Six Escalation Scenarios Spiraling to World Nuclear War," http://www.carolmoore.net/nuclearwar/alternatescenarios.html)

There is a whole body of knowledge and assumptions that is taken into account when putting together scenarios like the below. My bottom line assumption is that any nuclear exchange has an excellent chance of resulting in a series of escalations that will spiral out of control, setting off a round of exchanges among various enemies under a "use it or lose it" philosophy, as well as among the treaty allies of the relevant nuclear powers and their allies. This continues until most of the planets' 20,000 odd nuclear weapons are exhausted. In making "limited nuclear war" calculations all nations should assume "whatever can go wrong, will go wrong." Unfortunately, too many strategizers assume they can conduct limited strikes and keep them limited.
Related assumptions include:** Any nuclear attack on a primary Russian target like Moscow, St. Petersburg, or nuclear command headquarters, by any nation or group, known or unknown, could lead to a commander turning on "The Dead Hand" strategy and/or prompt one or more of Russia's semi-autonomous military field commanders to retaliate against U.S. and European nuclear targets. Attacks on secondary targets or nuclear detonations very close to Russian soil also might lead to some sort of nuclear escalation.
** Any nuclear attack on US and/or European sites by any nation or group, known or unknown, probably will result in massive US and/or European retaliation against the known or assumed perpetrators or their known or assumed allies. ** It is likely that the U.S., Russia, China, Israel, India and Pakistan will use some of their weapons to attack other nuclear and non-nuclear nations which might threaten them after they have been devastated by nuclear war. ** Any nuclear attack on Israel by terrorists, or Pakistan, Russia or China will result in Israel's surviving land, air and submarine carried or based missiles being used against Arab and Muslim capitals. A particularly devastating attack (including with chemical or biological weapons) might result in possibly in a full scale "Samson Option" attack on European and Russian targets. The latter of course would result in Russian retaliation against the United States, perhaps its punishment for not having done enough to protect Israel.** Any nations use of nuclear weapons against a non-nuclear nation will be only someone less inflammatory than using them against a nuclear nation, especially if that nation has many treaty allies. It will ratchet all nuclear nations alert systems and lead to unforeseeable consequences that could easily spiral to world nuclear war.

A2: Limited Nuclear War – Won't Stay Limited – Detachment

Detachment of nuclear planners makes escalation inevitable despite the safety interests of national leaders
Krepon, author and President Emeritus of the Henry L. Stimson Center, **2004** (Michael, "Limited War, Escalation Control, and the Nuclear Option in South Asia," http://www.stimson.org/southasia/pdf/ESCCONTROLCHAPTER7.pdf)

There is an enormous gulf between what political leaders really think about nuclear weapons and what is assumed in complex calculations of relative "advantage" in simulated strategic warfare. Think-tank analysts …can assume that the loss of dozens of great cities is somehow a real choice for sane men. They are in an unreal world. In the real world of real political leaders … a decision that would bring even one hydrogen bomb on one city of one's own country would be recognized in advance as a catastrophic blunder; ten bombs on ten cities would be a disaster beyond history.34
Nuclear planners and bomb designers still inhabit a separate universe from political leaders. If contemporary evidence in the United States is needed in support of this proposition, one can look to the continued, albeit downsized, deployments of tactical nuclear weapons in Europe, the maintenance of thousands of warheads on high levels of alert, and the Bush administration's interest in a new and improved "bunker busting" nuclear weapon. It is even less surprising that Russia (with the tables turned, now with inferior ground forces and having to defend Kaliningrad rather than the west having to defend West Berlin) would continue to rely on tactical nuclear weapons for forward defense. Political leaders in Washington and Moscow continue to allow their nuclear establishments to fiddle with designs – although not yet to resume nuclear testing – while intuitively understanding that planning and the authorization for use are entirely separate matters.
Try as they might, US deterrence strategists were never able to offer a persuasive case on how escalation could be controlled while seeking an advantageous outcome once the nuclear threshold had been crossed. Theseobjectives remained at cross-purposes, because neither nuclear rival could achieve an overwhelming conventional and nuclear advantage over the other. Nor could either superpower achieve an effective defense that would permit the confident presumption of safety against nuclear retaliation. These conditions were not remotely achievable during the Cold War. Nor is it possible to envision how today, in vastly changed circumstances, a US or Russian leader could rationally conclude that the benefits of a single use of a nuclear weapon could possibly outweigh the negative consequences of breaking a taboo that has beenrespected for over half a century. A momentous decision of this kind is not made any easier by downsizing yields, improving earth penetration capabilities, or fiddling with weapon effects.

A2: Limited Nuclear War – Even Limited War ➔ Extinction

As few as 100 bombs could trigger nuclear winter
SGR 2003
(Scientists for Global Responsibility, Newsletter, "Does anybody remember the Nuclear Winter?" July 27, http://www.sgr.org.uk/climate/NuclearWinter_NL27.htm)

<The prediction of nuclear winter was first published by a group headed by Carl Sagan in 1983 (TTAPS, 1983). The research group became known as 'TTAPS', after the initials of the five scientists involved. A number of other studies were published in the next few years, including major reports by The Swedish Academy of Sciences, and SCOPE (Scientific Committee on Problems of the Environment), and the U.S. National Research Council (NRC, 1985).
Throughout this period, many attempts were made by government and military scientists to play down the possible consequences. They argued that the effects would not be nearly so severe, and began talking of a 'nuclear autumn'.
In 1990 the TTAPS group decided to publish a further paper (TTAPS, 1990), in which they reviewed in detail the later studies, and made some modifications to their 1983 results. Some of these were in the direction of more severe changes, others towards milder changes. But overall the general picture was little changed. One very notable conclusion that was reiterated from the 1983 study was that if oil refineries were the main targets, only 100 bombs would be enough to cause a nuclear winter.>

Even a limited nuclear war would be massively destructive-radiation, water contamination, economic break down, regional conflagrations, forest fires, and nuclear winter
Beres, 1986
(Louis Rene, Professor of Political Science at Purdue, Security or Armageddon, pg. 11-12)

<Even the most limited nuclear exchange would signal unprecedented catastrophe. The immediate effects of the explosions—thermal radiation, nuclear radiation, and blast damage—would cause wide swaths of death and devastation. Victims would suffer flash and flame burns. Retinal burns could occur in the eyes of persons at distances of several hundred miles from the explosion. People would be crushed by collapsing buildings or torn by flying glass. Others would fall victim to raging firestorms and conflagrations. Fallout injuries would include whole-body radiation injury, produced by penetrating, hard gamma radiation; superficial radiation burns produced by soft radiations; and injuries produced by deposits of radioactive substances within the body.
In the aftermath, medical facilities that might still exist would be stressed beyond endurance. Water supplies would become unusable as a result of fallout contamination. Housing and shelter would be unavailable for survivors. Transportation and communication would break down to almost prehistoric levels. And overwhelming food shortages would become the rule for at least several years.
Since the countries involved would have entered into war as modern industrial economies, their networks of highly interlocking and interdependent exchange systems would now be shattered. Virtually everyone would be deprived of a means of livelihood. Emergency fire and police services would be decimated altogether. Systems dependent upon electrical power would cease to function. Severe trauma would occasion widespread disorientation and psychological disorders for which there would be no therapeutic services.
In sum, normal society would disappear. The pestilence of unrestrained murder and banditry would augment the pestilence of plague and epidemics. With the passage of time, many of the survivors could expect an increased incidence of degenerative diseases and various kinds of cancer. They might also expect premature death, impairment of vision, and a high probability of sterility. Among the survivors of Hiroshima, for example, an increased incidence of leukemia and cancer of the lung, stomach, breast, ovary, and uterine cervix has been widely documented.
Such a war could also have devastating climatic effects. It is now widely understood that even the explosion of a mere 100 megatons (less than 1 percent of the world's arsenals) would be enough to generate an epoch of cold and dark nearly as severe as in the 5,000-megaton case. As we have learned from Carl Sagan, the threshold for the nuclear winter is very low.2">

Even limited nuclear war would end all life—destroys the ozone
Falconi, writer, physicist and consultant in computing and electro-optics**, 1981** (Oscar, "The Case for Space Colonization—Now!-and why it should be our generation's #1 priority," http://nutri.com/space/)

We are all well aware of the nuclear confrontation during the Cuban Missile crisis. If the two most advanced, and presumably most mature, of the world's countries can almost have a nuclear war, it's clear that several of the smaller countries will in time, probably soon, have their own nuclear war. We can only hope that the war will be a very limited one, and that it won't trigger some atmospheric or runaway event. But recent studies indicate that the nitrogen oxides released into the stratosphere by even a "limited" nuclear war can affect the ozone concentration to the extent that our earth's ecological balance would be so completely altered that all life could cease to exist.

A2: Limited Nuclear War – Even Limited War ➔ Extinction

Contained nuclear wars still cause nuclear winter—studies prove
Sagan, Former Professor of Astronomy at Harvard University**, 1985**, (Carl, “The Nuclear Winter,” http://www.cooperativeindividualism.org/sagan_nuclear_winter.html)

But what if nuclear wars can be contained, and much less than 5000 megatons is detonated? Perhaps the greatest surprise in our work was that even small nuclear wars can have devastating climatic effects. We considered a war in which a mere 100 megatons were exploded, less than one percent of the world arsenals, and only in low-yield airbursts over cities. This scenario, we found, would ignite thousands of fires, and the smoke from these fires alone would be enough to generate an epoch of cold and dark almost as severe as in the 5000 megaton case. The threshold for what Richard Turco has called The Nuclear Winter is very low.

Even a limited nuclear war would cause a nuclear winter that leads to starvation and risks extinction
Weston, 1987 (Burns, Iowa College of Law, American Journal of International Law, 81 A.J.I.L. 1003, L/N)

<What is particularly noteworthy about The Night After, however, is the fact that, though based on different research programs and methodologies, it chronicles findings that are completely consistent with those reached by the American scientists. Even a relatively small nuclear war, it tells us, could so blot out the sun and so damage the ozone because of the smoke, soot and dust it would place in the atmosphere that it would produce literally months of subfreezing temperatures worldwide, creating an unprecedented climatic catastrophe that would cause widespread agricultural failure and mass [*1004] human starvation. With these findings, of course, The Night After, like its American counterpart, helps to focus responsible attention on the fact that nuclear war directly implicates human extinction, hence, national suicide by any state irrational enough to launch a nuclear first strike on the misguided assumption that it would not suffer equivalent damage.
Recently, to be sure, findings such as this one have come under critical scrutiny. n1 "[T]he apocalyptic conclusions of the initial nuclear winter hypothesis," it is said, "can now be relegated to a vanishingly low level of probability." n2 Temperature changes resulting from a nuclear war, we are told, would resemble more a "nuclear fall" than a "nuclear winter." n3 Still, even the critics acknowledge that disastrous "secondary" environmental effects of nuclear war -- previously thought insignificant compared to the direct effects of a nuclear exchange -- remain "highly plausible" and important factors in any assessment of the viability of strategic doctrines.>

A2: Nuclear War ➔ Mindset Shift

No mindset shift-nuclear conflict causes a renewed arms race and escalation-radiation spills into other countries
Beres, 1974
(Louis Rene, Professor at Penn, Apocalypse, pg. 159-160)

<In all likelihood, certain of the biological and ecological effects of a nuclear war between two countries would be felt in other countries as well. Radioactive fallout does not respect political boundaries. Because of the way that nuclear explosions behave in the atmosphere, the altitude reached by the mushroom-shaped cloud would depend on the force of the explosion. For yields in the low-kiloton range, the cloud would remain in the lower atmosphere, and its effects would be entirely local. That is, they would not extend beyond the boundaries of the combatant countries. However, for yields exceeding 30 kilotons, part of the cloud of radioactive debris would "punch" into the stratosphere, affecting many non-combatant countries as well.13

At the international level, the political effects of a nuclear war between two countries would be enormous. Since the nuclear firebreak would have been crossed, every state in the system would fear that the long-standing inhibitions against nuclear war-fighting were no longer operative. Within the resultant atmosphere of suspicion and apprehension, every state would begin to fear that it might become the victim of a preemptive strike. And such fears would generate new incentives to preempt.

For those states that had not yet joined the nuclear club, the occasion of a two-country nuclear war would almost certainly mitigate on behalf of membership. Any previous inhibitions about "going nuclear" would most likely be cast aside in the wake of actual nuclear combat between two states. While such a scramble for nuclear weapon status might not be a rational reaction to the situation, history suggests it is a likely one.

In terms of international law, such a reaction would provide an inevitable deathblow to the entire nonproliferation regime. Whatever hopes had existed for enforcing the claims of the Treaty on the Non-Proliferation of Nuclear Weapons and its associated international treaties and agreements would almost surely disappear. Whatever incentives had been held out by present members of the nuclear club to discourage further membership would now be overridden by the presumed security advantages of nuclear weapon status. The principles of realpolitik would be embraced by even those states that had formerly shown an interest in worldwide cooperative searches for security, and the nuclear supplier states would be moved to step up their commercial activities in the transfer of sensitive nuclear technology and facilities.>

No Recovery From Nuclear War

Nuclear war destroys the environment and food-crop productivity and the possibility for recovery of civilizations
Harwell, 1985
(Mark A., Associate Director of the Ecosystems Research Center, Cornell University, BioScience, Vol. 35, No. 9, After Nuclear War. Oct. 1985, pg 550-1, Jstor)

<One important new aspect is the elimination of any substantive outside assistance after a nuclear war. In Hiroshima, such aid provided medical care, uncontaminated food and water, reconstruction of the urban infrastructure, economic assistance, and social order—which eventually led to the rebirth of a modern city. Recovery after future nuclear attacks could not follow the same pathways, for the very bases of the civilizations of the developed world would be globally undermined.
Another critical new aspect of a modern war is the initiation of atmospheric perturbations resulting in global climatic changes, the phenomenon of nuclear winter. Much scientific research focuses on reducing the uncertainties associated with nuclear winter, but this much is clear: Only the most precisely concocted and carefully controlled nuclear war could be counted upon not to induce global climatic effects. These effects would include reductions in sunlight, air temperatures, and precipitation throughout at least the Northern Hemisphere, accompanied by extreme weather and a plethora of other environmental insults—in short, war against the global environment itself.
Among the most sensitive systems to such stresses is agriculture; only a few degrees' reduction in average temperatures would devastate the major food crops. The growing scientific consensus is that agricultural productivity in the first growing season after a nuclear war could be essentially eliminated, and subsequent years' crops could also be drastically reduced or nonexistent because of longer-term climatic alterations— even ignoring the catastrophic effects of losing high-energy subsidies to agriculture. Visions of direct human casualties from freezing in an intense nuclear winter are being replaced by more probable projections of pervasive starvation, as the food supply— measured in months for most of the world's population—becomes exhausted long before agricultural productivity could possibly be restored.>

Heat Death Turn To Spark And Wipeout

Technological advancement is key to Type II and III civilizations – only they can create inter-universal wormholes to escape at the end of the universe
Slate.com in '04
(Jim Holt, "How Will The Universe End?" March 4, http://www.slate.com/id/2143403/entry/2096507/)

Tipler's idea of an infinite frolic just before the Big Crunch was seductive to me—more so, at least, than Dyson's vision of a community of increasingly dilute Black Clouds staving off the cold in an eternal Big Chill. But if the universe is in a runaway expansion, both are pipe dreams. The only way to survive in the long run is to get the hell out. Yet how do you escape a dying universe if—as little Alvy Singer pointed out—the universe is everything?
A man who claims to see an answer to this question is Michio Kaku. A theoretical physicist at City College in New York, Kaku looks and talks a bit like the character Sulu on Star Trek. (He can be seen in the recent Michael Apted film about great scientists, Me and Isaac Newton.) He is not the least bit worried about the fate of this universe. "If your ship is sinking," he said to me, "why not get a lifeboat and leave?" We earthlings can't do this just yet, Kaku observed. That is because we are a mere Type 1 civilization, able to marshal the energy only of a single planet. But eventually, assuming a reasonable rate of economic growth and technological progress, we will graduate to being a Type 2 civilization, commanding the energy of a star, and thence to being a Type 3 civilization, able to summon the energy of an entire galaxy. Then space-time itself will be our plaything. We'll have the power to open up a "wormhole" through which we can slip into a brand new universe.
"Of course," Kaku added, "it may take as long as 100,000 years for such a Type 3 civilization to develop, but the universe won't start getting really cold for trillions of years." There is one other thing that the beings in such a civilization will need, Kaku stressed to me: a unified theory of physics, one that would show them how to stabilize the wormhole so it doesn't disappear before they can make their escape. The closest thing we have to that now, superstring theory, is so difficult that no one (with the possible exception of Ed Witten) knows how to get it to work. Kaku wasn't the least bit gloomy that the universe might be dying. "In fact," he said, "I'm in a state of exhilaration, because this would force us, really force us, to crack superstring theory. People say, 'What has superstring theory done for me lately? Has it given me better cable TV reception?' What I tell them is that superstring theory—or whatever the final, unified theory of physics turns out to be—could be our one and only hope for surviving the death of this universe."

This means we control the ultimate uniqueness – the big freeze will kill not only humans but ALL INTELLIGENT LIFE
San Francisco Chronicle in '04
(Keay Davidson, Science Writer, "Physicists mull year's top events: Institute's list of most significant developments draws debate", December 6, http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2004/12/06/MNGP3A72PB1.DTL)

This year's apparent confirmation of the accelerating-universe hypothesis thrilled the noted physicist-author Michio Kaku of City University of New York.
"What has excited me personally about the top stories of 2004 was confirmation that the universe is accelerating, a staggering discovery that has deep philosophical and even theological implications," Kaku said by e-mail. "When it was first announced a few years ago that the universe was not just expanding, but actually accelerating, in a runaway mode, the world of physics was agog, with mouths hanging open, but die-hard skeptics demanded more confirmation. How could the universe be careening out of control? ...
"This has philosophical implications, because it means that the universe is dying, and eventually the Big Freeze will kill off all intelligent life forms. This has theological implications, because what is the meaning of life if all life is doomed to freeze by the laws of physics? What kind of deity would allow life, in all its glory, to flower in the universe, and then snuff it out cruelly by freezing it to death?
"Personally, I believe that the only hope for intelligent life to escape the death of the universe is to leave the universe itself. ... If our universe one day becomes too cold to support life, then perhaps we will be forced to harness the most advanced physics to open up a hole in space, travel between dimensions, to a much younger, warming universe."

Heat Death Turn Extensions – Heat Death Kills Us All

Universal expansion makes extinction inevitable – all life will cease in a cold darkness
Kaku in '04

(Michio, Professor of Physics at City University of New York, Discover, "How to Survive the End of the Universe (In 7 Steps): The cold, dark end is coming. We need an escape plan", Volume 25, Number 12, December, http://www.discover.com/issues/dec-04/features/survive-end-of-universe/)

The universe is out of control. Not only is it expanding but the expansion itself is accelerating. Most likely, such expansion can end only one way: in stillness and total darkness, with temperatures near absolute zero, conditions utterly inhospitable to life. That became evident in 1998, when astronomers at the Lawrence Berkeley National Laboratory and Australian National University were analyzing extremely distant, and thus ancient, Type Ia supernova explosions to measure their rate of motion away from us. (Type Ia supernovas are roughly the same throughout the universe, so they provide an ideal "standard candle" by which to measure the rate of expansion of the universe.)

Physicists, scrambling to their blackboards, deduced that a "dark energy" of unknown origin must be acting as an antigravitational force, pushing galaxies apart. The more the universe expands, the more dark energy there is to make it expand even faster, ultimately leading to a runaway cosmos. Albert Einstein introduced the idea of dark energy mathematically in 1917 as he further developed his theory of general relativity. More evidence came last year, when data from the Wilkinson Microwave Anisotropy Probe, or WMAP, which analyzes the cosmic radiation left over from the Big Bang, found that dark energy makes up a full 73 percent of everything in the universe. Dark matter makes up 23 percent. The matter we are familiar with—the stuff of planets, stars, and gas clouds—makes up only about 4 percent of the universe.

As the increasing amount of dark energy pushes galaxies apart faster and faster, the universe will become increasingly dark, cold, and lonely. Temperatures will plunge as the remaining energy is spread across more space. The stars will exhaust their nuclear fuel, galaxies will cease to illuminate the heavens, and the universe will be littered with dead dwarf stars, decrepit neutron stars, and black holes. The most advanced civilizations will be reduced to huddling around the last flickering embers of energy—the faint Hawking radiation emitted by black holes. Insofar as intelligence involves the ability to process information, this, too, will fade. Machines, whether cells or hydroelectric dams, extract work from temperature and energy gradients. As cosmic temperatures approach the same ultralow point, those differentials will disappear, bringing all work, energy flow, and information—and the life that depends on them—to a frigid halt. So much for intelligence.

didn't think we had cards on that did you?

Heat Death Turn Extensions – A2: Physics Preclude Inter-Universal Travel

Escape to another parallel universe is physically and biologically feasible – parallel universes are forming all the time
Kaku in '04

(Michio, Professor of Physics at City University of New York, Discover, "How to Survive the End of the Universe (In 7 Steps): The cold, dark end is coming. We need an escape plan", Volume 25, Number 12, December, http://www.discover.com/issues/dec-04/features/survive-end-of-universe/)

A cold, dark universe is billions, if not trillions, of years in the future. Between now and then, humans will face plenty of other calamities: wars and pestilences, ice ages, asteroid impacts, and the eventual consumption of Earth—in about 5 billion years—as our sun expands into a red giant star. To last until the very end of the universe, an advanced civilization will have to master interstellar travel, spreading far and wide throughout the galaxy and learning to cope with a slowing, cooling, darkening cosmos. Their greatest challenge will be figuring out how to not be here when the universe dies, essentially finding a way to undertake the ultimate journey of fleeing this universe for another.
Such a plan may sound absurd. But there is nothing in physics that forbids such a venture. Einstein's theory of general relativity allows for the existence of wormholes, sometimes called Einstein-Rosen bridges, that connect parallel universes. Among theoretical and experimental physicists, parallel universes are not science fiction. The notion of the multiverse—that our universe coexists with an infinite number of other universes—has gained ground among working scientists.
The inflationary theory proposed by Alan Guth of MIT, to explain how the universe behaved in the first few trillionths of a second after the Big Bang, has been shown to be consistent with recent data derived from WMAP. Inflation theory postulates that the universe expanded to its current size inconceivably fast at the very beginning of time, and it neatly explains several stubborn cosmological mysteries, including why the universe is both so geometrically flat and so uniform in its distribution of matter and energy. Andrei Linde of Stanford University has taken this idea a step further and proposed that the process of inflation may not have been a singular event—that "parent universes" may bud "baby universes" in a continuous, never-ending cycle. If Linde's theory is correct, cosmic inflations occur all the time, and new universes are forming even as you read these words.
Naturally, the proposal to eventually flee this universe for another one raises practical questions. To begin with, where exactly would an advanced civilization go?

Heat Death Turn Extensions – A2: Humans Can't Travel Through Wormhole

Nanobots can recreate human civilization on the other side of the worm hole
Kaku in '04

(Michio, Professor of Physics at City University of New York, Discover, "How to Survive the End of the Universe (In 7 Steps): The cold, dark end is coming. We need an escape plan", Volume 25, Number 12, December, http://www.discover.com/issues/dec-04/features/survive-end-of-universe/)

Assume now that the wormholes created in the previous steps prove unworkable. Perhaps they are unstable, or too small to pass through, or their radiation effects are too intense. What if future scientists find that only atom-size particles can safely pass through a wormhole? If that is the case, intelligent life may have but one remaining option: Send a nanobot through the wormhole to regenerate human civilization on the other side.

This process occurs all the time in nature. An oak tree produces and scatters seeds that are compact, resilient, packed with all the genetic information necessary to re-create a tree, and loaded with sufficient nourishment to make colonization possible. Using nanotechnology, an advanced civilization might well be able to encode vast quantities of information into a tiny, self-replicating machine and send this machine through a dimensional gateway. Atom-size, it would be able to travel near the speed of light and land on a distant moon that is stable and full of valuable minerals. Once situated, it would use the raw materials at hand to create a chemical factory capable of making millions of copies of itself. These new robots would then rocket off to other distant moons, establish new factories, and create still more copies. Soon, a sphere of trillions of robot probes would be expanding near the speed of light and colonizing the entire galaxy.

Next, the robot probes would create huge biotechnology laboratories. They would inject their precious cargo of information—the preloaded DNA sequences of the civilization's original inhabitants—into incubators and thereby clone the entire species. If future scientists manage to encode the personalities and memories of its inhabitants into these nanobots, the civilization could be reincarnated.

A2: HAARP

1. Their impact scenarios are empirically denied – HAARP technology has been in use since the 1970s and the project isn't big enough to do any damage.
Busch 97

(Linda, February 21, 1997, "Ionosphere Research Lab Sparks Fears in Alaska", Science magazine, writer for the American Association for the Advancement of Science, http://www.sciencemag.org/cgi/content/full/275/5303/1060?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=weather+manipulation&searchid=1&FIRSTINDEX=20&resourcetype=HWCIT)

But anti-HAARP skeptics claim that the military has even bigger plans for the project. HAARP's somewhat menacing appearance surely hasn't helped resolve its public-relations problem: 48 21-meter radio antennas now loom behind the Gakona facility's barbed-wire fence, and, when completed, the 9-hectare antenna farm will be stuffed with 180 towers. In his book, Begich, who is the informal spokesperson for the loosely knit anti-HAARP coalition, writes that all this technology is part of a DOD plan to raise a Star Wars-type missile shield and devise technologies for jamming global communications worldwide. Physical chemist Richard Williams, a consultant for the David Sarnoff Institute in Princeton, New Jersey, further argues that HAARP could irreparably damage the ionosphere: "This is basically atmospheric physicists playing with the ionosphere, which is vital to the life of this planet." Also, he asserts that "this whole concept of electromagnetic warfare" needs to be "publicly debated."
The HAARP critics have asked for a public conference to discuss their concerns and hear more details about the science from the military. They have written hundreds of letters to Alaska's congressional delegation and have succeeded in getting the attention of several state legislators, who held legislative hearings on the subject last year.
Many scientists who work on HAARP are dumbfounded by the charges. "We are just improving on technology that already exists," says Heckscher. He points out that the Max Planck Institute has been running a big ionospheric "heater" in Tromsø, Norway, since the late 1970s with no lasting effects. U.S. scientists don't have good access because the United States did not join the Norwegian consortium. Also, the United States already operates two other small ionospheric heaters, at the Arecibo Observatory in Puerto Rico and at HIPAS, operated by the University of California, Los Angeles, 325 kilometers down the road from HAARP in Chena Hot Springs, Alaska. The HAARP facility, with three times the power of current facilities and a vastly more flexible radio beam, will be the world's largest ionospheric heater.
Still, it will not be nearly powerful enough to change Earth's climate, say scientists. "They are talking science fiction," says Syun-Ichi Akasofu, who heads the University of Alaska's Geophysical Institute in Fairbanks, the lead institution in a university consortium that made recommendations to the military about how HAARP could be used for basic research. HAARP won't be doing anything to the ionosphere that doesn't happen naturally as a result of solar radiation, says Akasofu. Indeed, the beam's effect on the ionosphere is minuscule compared to normal day-night variations. "To do what [the critics] are talking about, we would have to flatten the entire state of Alaska and put up millions of antennas, and even then, I am not sure it would work."
Weather is generated, not in the ionosphere, but in the dense atmosphere close to Earth, points out University of Tulsa provost and plasma physicist Lewis Duncan, former chair of the U.S. Ionospheric Steering Committee. Because HAARP's radio beam only excites and heats ionized particles, it will slip right through the lower atmosphere, which is composed primarily of neutral gases. "If climate modifications were even conceivable using this technology, you can bet there would be a lot more funding available for it," he jokes.

2. Turn – Ozone Depletion
A. HAARP is key to solving Ozone Depletion
Rembert 97

(Tracey C, January 11 1997, "Discordant HAARP; High-Frequency Active Auroral Research Program", E: The Environmental Magazine, coordinator of Co-op America, Editor of Shareholder's Action Quarterly http://www.findarticles.com/p/articles/mi_m1594/is_n1_v8/ai_19192505/pg_3)

So far, proponents of HAARP have concentrated solely on its defensive and tactical military applications, but one patent speculates that the device would be able to alter "upper-atmosphere wind patterns...so that positive environmental effects can be achieved...For example, ozone, nitrogen and other concentrations in the atmosphere could be artificially increased." HAARP could also theoretically create rain in drought-ridden areas, decrease rains during flooding and redirect hurricanes, tornadoes and monsoons away from populated areas.

A2: HAARP

B. Ozone depletion causes extinction
Greenpeace in '95
("Full of Homes: The Montreal Protocol and the Continuing Destruction of the Ozone Layer, http://archive.greenpeace.org/ozone/holes/holebg.html)

When chemists Sherwood Rowland and Mario Molina first postulated a link between chlorofluorocarbons and ozone layer depletion in 1974, the news was greeted with scepticism, but taken seriously nonetheless. The vast majority of credible scientists have since confirmed this hypothesis.
The ozone layer around the Earth shields us all from harmful ultraviolet radiation from the sun. Without the ozone layer, life on earth would not exist. Exposure to increased levels of ultraviolet radiation can cause cataracts, skin cancer, and immune system suppression in humans as well as innumerable effects on other living systems. This is why Rowland's and Molina's theory was taken so seriously, so quickly - the stakes are literally the continuation of life on earth.

3. Their impacts are science fiction – their authors assume a project 1,000 times more powerful than HAARP
Cole, 95 (September 17, writer for Fairbanks News-Miner and 5-time published nonfiction author, "HAARP Controversy" http://www.haarp.alaska.edu/haarp/news/fnm995.html)

Alaskan Nick Begich Jr., who recently got a doctorate in the study of alternative medicine from a school based in Sri Lanka, has written and published a new book in which he alleges that HAARP could lead to "global vandalism" and affect people's "mental functions." Syun Akasofu, director of the Geophysical Institute, said the electric power in the aurora is hundreds of thousands of times stronger than that produced by HAARP.The most outlandish charges about HAARP are that it is designed to disrupt the human brain, jam all communications systems, change weather patterns over a large area, interfere with wildlife migration, harm people's health and unnaturally impact the Earth's upper atmosphere. These and other claims appear to be based on speculation about what might happen if a project 1,000 times more powerful than HAARP is ever built.That seems to be in the realm of science fiction.

Wrong – HAARP won't cause warming – its signals are a million times less powerful than government approved safety levels
Rozell 97 (Ned, science writer at Geophysical Institute University of Alaska Fairbanks, June 5, "Why All the Harping About HAARP?" http://www.gi.alaska.edu/ScienceForum/ASF13/1340.html)

Is HAARP dangerous? Well, HAARP signals are one million times less dangerous than government-approved safety levels for any electrical signal. HAARP's transmitter currently has a power of 1/3 megawatt, which might be boosted to 3 megawatts in a few years, Heckscher said.
He compared HAARP's effect on the vast ionosphere to the warming that would be experienced by the whole Copper River if you dipped in a small electric coil of the type used to warm one single cup of coffee. This is why Akasofu describes rumors he's heard circulating about HAARP as dangerous to people or the environment as pure science fiction. HAARP could present a potential danger to electronic equipment in aircraft that is flying overhead when the transmitter is turned on, but there are safety precautions against that. HAARP operators notify the Federal Aviation Administration with the HAARP transmission schedule and engineers are installing an aircraft-detection radar at HAARP to further ensure the safety of overflying aircraft. This same procedure is followed when rockets are launched from Poker Flat Research Range into the upper atmosphere.

Wrong – HAARP won't lead to ionization – two reasons
The HAARP Scientists, 01
(March 14, http://www.haarp.alaska.edu/haarp/ion4.html, the scientists who work on HAARP writing about it on the HAARP website, "What Are the Effects of HAARP on the Ionosphere?")

During active ionospheric research, a small, known amount of energy is added to a specific region of one of the ionospheric layers as discussed previously. This limited interactive region directly over the facility, will range in size, depending on the frequency of operation and layer height, from as little as 9 km in radius to as much as 40 km in radius and may be as much as 10 km in thickness. The interactions occur only with ionized particles in the layer; neutral (non-ionized) particles, which outnumber ionized particles by 500:1 or greater, remain unaffected.
HAARP is not able to produce artificial ionization for the following two reasons.

1. The frequencies used by the HAARP facility are in the High Frequency (HF) portion of the spectrum. Electromagnetic radiation in the HF frequency range is *non-ionizing* - as opposed to the sun's ultraviolet and X-ray radiation whose photons have sufficient energy to be *ionizing*.

2. The intensity of the radiation from the completed HAARP facility at ionospheric heights will be too weak to produce artificial ionization through particle interactions. The power density produced by the completed facility will not exceed 2.8 microwatts per cm^2, about two orders of magnitude below the level required for that process.

didn't think we had cards on that did you?

A2: Inertia Weapons

1. This is science fiction – Smith has no qualifications, cites no research, and a google search using the terms in the article has 132 results; their author, and a bunch of teenagers on message boards talking about video games. There is zero mention of this by any government official – this argument would be more credible if they had made it up.

2. Game over – Intertia weapons are key to deterrence, they are our only chance at avoiding complete extinction – this is their author, and we are the only ones reading the conclusion of his article
Smith 03 (Wayne, Space Daily 4/14, The Ultimate Weapon, http://www.spacedaily.com/news/nuclear-blackmarket-03b.html)

Nuclear bombs are arguably the most devastating military weapon ever deployed by humankind. As a consequence of their development we have ironically enjoyed generations of relative peace on this planet.Everyone is just too frightened to start another world war. However, the holiday may be coming to an end as nuclear proliferation starts to escalate uncontrollably. In the beginning only the US had access to this technology and used it to finally end the greatest war this world had ever witnessed. Right or wrong, nobody can seriously question the total unconditional surrender of Japan as not being a direct consequence of the Hiroshima and Nagasaki bombings.Now the nuclear club is growing towards double figures although many of its new members aren't "officially" recognised. Many nations leaders are unhappy about the way some other countries have the bomb and they don't.Even those in as close proximity to the US as Mexico have expressed grievances over this issue. It is believed that more than a couple of countries are taking matters into their own hands by developing nuclear weapons arsenals secretly.It certainly wouldn't be the first time and a nuclear strike is not so intimidating a threat when everybody has the ability to counterstrike. As the number of global arsenals increase so grows the possibility they might in fact be used. Then all hell breaks loose and you can kiss your pension goodbye. We had many close calls during the cold war and can look forward more in the future. It might be the result of international tensions. A flock of birds mistakenly judged by radar operators to be a first strike. Perhaps a terrorist act or a meteor.One time the Russians mistook a rocket carrying a weather satellite on its way to study the aurora borealis as being a thermonuclear warhead targeted for Moscow. Accidents happen. How do you say sorry for mistakenly decimating a capital city. Is any nation on earth pussy enough not to retaliate if it has the means?Something of course needs to be done but nobody has any workable answers. Clearly everyone can't be trusted to disarm. Not in the real world. The temptation to hide some warheads would be too great and the shifts in international power would impact us in quite devastating ways. Conventional wars wouldn't be stymied by the nuclear card any more. What if all the racial tensions, political turmoil and religious zeal that has brewed and festered in its kettle for past generations proved stoppable only by the nuclear genie? China would probably invade Taiwan for a start.Nukes have made more conventional weapons pale into insignificance and countries like North Korea, India, Pakistan and Israel realise the political clout afforded to them by ballistic missiles with nuclear warheads attached. It seems to be a vicious circle we can't escape but can only watch tighten around us.Only one weapon can do to the nuclear arsenals of this world what nuclear arsenals have done to conventional arms. Yes, a bigger stick does exist although it isn't much talked about. One that makes nukes a less attractive poor cousin by comparison.**Inertia weapons** have that potential. What's an inertia weapon? On a smaller scale, inertia weapons known as cars kill over a million people every year. To nations wanting the ultimate weapon no matter what the cost, a space inertia weapon is the holy grail.We are no strangers to this horror. It has visited numerous mass extinctions upon us in the past. Some of them responsible for removing up to 95% of life on Earth in one swift hammer blow. Everybody now knows that the most likely cause for the demise of the dinosaurs was a comet or asteroid striking around 65 million years ago.They also know that this created an opportunity for our small furry rat like ancestors to step in and take control. In fact its now believed the biosphere of our planet has almost started over from scratch many many times because of such planetary impacts.There has been much talk of late on how we might detect and even defend ourselves from such a catastrophe in the near future but nobody seems to be asking the next obvious question. Could such a weapon now be wielded by humans? The answer is a definite yes.While a nuclear explosion might destroy a maximum radius of approximately 37km due to the curvature of the earth, a large asteroid could decimate an entire continent. Asteroids require no replenishment of fissionable elements or other expensive maintenance and there are millions of them within easier reach than the moon.It's just like playing billiards. Every object in the universe in accordance with Newtonian laws travels in a straight line unless another force is applied to it.Unlike billiards there is virtually no friction in space so an object will maintain any velocity and heading indefinitely. At least until its redirected or something stops it.A spacefaring nation would have no trouble calculating the mathematical solutions for precisely changing an asteroid's trajectory. Then its a simple matter of nudging it. Push in the right spot and maintain the pressure until your gun is pointed at an appropriate target. This might be achieved in many ways.Reaction mass to drive your inertia weapon could be rocket propellant or the asteroids own mass. Just attach explosives or a few mass drivers. Whoever reaches deep space first will therefore be faced with the choice of utilising these 'inertia weapons' and the temptation will be great indeed. A big space rock could wipe out any enemy and the threat alone would equate to political clout beyond human comprehension.A city can after all be evacuated if a nuclear strike is threatened, but a country?If a nation chose to conquer the high ground of space then keeping everybody else out of it would be all that's necessary to ensure world dominance. Inertia weapons cannot proliferate unless more than one nation can actually reach them. The race to space could therefore end up being a race for control of the earth and solar system. I doubt any of this has escaped our leaders, both east and west.Would this be a bad thing? No worse than the first atomic bomb. The fact that it's unavoidable if we want space travel makes the question absurd. Why wouldn't a space faring nation seize a weapon ensuring it world dominance? Suppose this capability fell into the wrong hands though or was allowed to be owned by many spacefaring nations. Should that happen we might still see nuclear weapons become redundant and inertia weapons replace them as the newest threat to humanity.It would mean a new "Cold War" on a scale to dwarf the previous US and Russian one. A nuclear war despite all the bad press is in fact survivable. Not all human life would be eradicated and if all the nukes in the world were launched then we in the west might be set back a century. It would be nasty but not the end. It might seem like it but we would eventually recover.The same can't be said for a space war where mountains are directed at the earth.When the first space probe experimentally landed on the asteroid Eros recently, that celestial bodies motion was imperceptibly changed by the gentle bump of a manmade spacecraft for the very first time. A herald of greater things to come maybe. Nobody can accurately predict the future and I don't want to add my name to the long list of failed seers in history.The technology however is more than a prediction and has existed for a very long time. A new space race looks set between the US and enthusiastic newcomer China which I would call a safe bet. Now what do we do if China one day announces Ceres to be on course for the US and they want Taiwan in exchange for "assistance"?We might truly learn what it means to see the sky falling.In the movies "Armageddon" and "Deep Impact" we saw nukes save the earth in from both a rogue asteroid and a comet. Perhaps it will ironically prove to be the other way around. The threat of genocide from space might be persuasive enough to make nations disarm.Ultimately averting a future nuclear war. Expensive nuclear warheads would become second rate weapons.Expensive and redundant ones in the face of that firepower.

This argument proves we control uniqueness – asteroids will inevitably strike earth with or without inertia weapons – only technology gets us into space which is key to survive asteroid strikes

A2: Inertia Weapons

Directing an asteroid at earth would require too much energy – it is a small risk and is redundant with nukes
Space Policy in 02
(“Book Review; Target Earth”, Volume 18, Issue 1, February, http://abob.libs.uga.edu/bobk/ccc/cc021502.html)

There is still the question as to what could or should be done if an impact threat is discovered. The MIT Project Icarus in 1967 calculated that six Saturn V launchers carrying 100 nuclear warheads would be needed to divert that asteroid if it became a hazard, as in its present orbit it conceivably could. Saturn V is no longer available but a similar effort could no doubt be mounted, given sufficient warning. The problem is the `Deflection Dilemma': if you can deflect asteroids or comets away from the Earth, that raises the possibility of deflecting them towards it. Duncan Steel's answer to that is not to build such a system until an actual threat is detected, but there's still the possibility of things sneaking up on us: one reason why we're still arguing about the nature of the Tunguska object in 1908 is that it approached from the direction of the Sun and wasn't seen until it entered the atmosphere. Watching for that would require eternal vigilance in space as well as on Earth, and we know how quickly governments tire of such things: the US administration turned off the science stations left by astronauts on the Moon only 5 years after Apollo, and cancelled the Search for Extraterrestrial Intelligence long before there was a realistic chance of success.
But those of us who would like to see deflection systems developed now can take heart from a contribution to the 2001 Charterhouse conference on British rocketry by David Asher and Nigel Holloway. They made headlines with an outline of what it would take to bring down a 500-m asteroid on Telford and devastate England from the Scottish Borders to Devon. It was worth attending just to witness the stunned silence in which veterans of Britain's nuclear weapons programme heard details of how a single asteroid, under malevolent control, could reduce the UK to rubble. As one 80-year-old remarked, "If it takes 12 years and 15 nuclear warheads to bring down an asteroid on us, why not just use the weapons in the first place?" On the more serious level of preventing the impacts, another old-timer remarked that the UK share of the events wouldn't pay for a new housing estate, let alone what it would cost to rebuild the country after such an occurrence. But the study demonstrates that using asteroids as weapons takes much more effort than simply turning them aside from Earth, so the Deflection Dilemma has lost much of its force.

Gravity tractors solve the impact
New Scientist in ‘05
(“’Gravity Tractor’ to Deflect Earth Bound Asteroids”, November 9, http://www.newscientist.com/article.ns?id=dn8291&feedId=online-news_rss20)

NASA scientists have come up with a surprisingly simple yet effective way to deflect an Earth-bound asteroid – park a large spacecraft close by and let gravity do the work.
Previous suggestions have focused on deflecting an incoming asteroid with nuclear explosions. But NASA experts believe a "gravity tractor" should be able to perform the same feat by creating an invisible towline to tug the rock off its deadly course.

Asteroid deflection solves asteroid deflection
Space.com in ‘06
(Robert Roy Britt, Science Writer, “New Cosmic Defense Idea: Fight Asteroids with Asteroids”, June 20, http://www.space.com/scienceastronomy/060620_science_tuesday.html)

No asteroids are presently known to be on collision courses with Earth. But existing holes in the ground suggest that inevitably one will eventually be found. There is no firm plan for how to deflect or destroy an incoming asteroid, though scientists have pondered firing rockets at them, moving them gently with solar sails, or nudging them with nuclear explosions.
Lock and load
The new idea is to capture a relatively small asteroid—perhaps 100 feet (30 meters) wide—by sending a robot to it.
The robot would heave material from the asteroid's surface into space, and the reaction force would gradually direct the asteroid to a Lagrange point, one of a handful of nodes along Earth's orbit where the gravity of Earth and the Sun balance out. Scientists know that objects can be kept stable at a Lagrange point with little or no energy.
The captured rocky weapon would be held there, traveling around the Sun ahead of or behind the Earth, held until needed.
Then, if a large asteroid threatens to hit us, the small one is moved into its path, using the same heaving technique. The rocks collide, and the big one is broken into somewhat less harmfull bits.
The collision disperses the fragments of the incoming asteroid, so that not all of them hit the planet.

A2: Time Travel

1. Turn – Time travel means we can go back in time and warn people about super-weapons including the risk of time travel which solves every other spark scenario and means we can give super future technology to people that helps them solves resource scarcity and prevent nuclear war

2. Time Travel Bad Impacts Are Conceptually Incoherent – If time travel is theoretically possible but destroys the universe someone in the future would have tried to travel back and destroyed the space-time of the universe of which we are a part – the fact that the universe exists in its present state proves no one has traveled in time now or in the future which means your impact won't and can't happen

3. Time travel won't destroy space time – if its possible it would preclude causality violations
New Scientist in '05
(Mark Buchanan, "No paradox for time travelers", June 18, http://www.newscientist.com/article.ns?id=dn7535&feedId=online-news_rss20)

THE laws of physics seem to permit time travel, and with it, paradoxical situations such as the possibility that people could go back in time to prevent their own birth. But it turns out that such paradoxes may be ruled out by the weirdness inherent in laws of quantum physics.
Some solutions to the equations of Einstein's general theory of relativity lead to situations in which space-time curves back on itself, theoretically allowing travellers to loop back in time and meet younger versions of themselves. Because such time travel sets up paradoxes, many researchers suspect that some physical constraints must make time travel impossible. Now, physicists Daniel Greenberger of the City University of New York and Karl Svozil of the Vienna University of Technology in Austria have shown that the most basic features of quantum theory may ensure that time travellers could never alter the past, even if they are able to go back in time.

4. Turn – Time travel defeats terrorism – anyone who opposes time travel hates freedom
USA TODAY in '02
(Kevin Maney, "Perhaps time travel could solve our terrorism problems", September 18, L/N0)

As President Bush threatens Iraq and agents bust terror cells in rural New York, the nation is overlooking one total solution to terrorism.
A time machine.
It's the one possible technology that holds a promise of completely defeating terrorists, by stopping them before they carry out an act. If we had one, federal marshals could go back to the morning of Sept. 11, 2001, and arrest the terrorists before they boarded those planes. In a move with broader implications, perhaps a special agent could be sent further into the past to prevent Osama bin Laden's parents from ever meeting.
So maybe it's time for the next Manhattan Project. We should pull together U.S. scientists for a crash program in time travel. Instead of inventing the ultimate weapon of mass destruction, they could create the ultimate weapon of pinpoint prevention.
The idea would seem crazy, except it's not -- at least in theory. In recent years, research by respected scientists has shown that the laws of physics allow for backward time travel. Popular cosmologist Stephen Hawking has changed his mind and now says time travel is possible, after long believing otherwise. Other scientists from institutions such as the California Institute of Technology and IBM Research are saying that time travel seems to be consistent with the way the universe works.

A2: Time Travel

5. Time travel is impossible
The Scotsman in '98
(Jim Gilchrist, "IT'S OFFICIAL. Scientists have concluded that time can move in only one direction – forward", December 3, L/N)

So that's it then. Say goodbye to that glittering crystal machine assembled in the Wellsian basement of your imagination, or, for that matter, to time -travelling DeLorean specials or calendar-defying police boxes. Resign yourself to the future: living in the past's a non-starter, deja vu a temporal red herring.
This news came as a bit of a blow.
Personally, I haven't had as yet any experience of time actually moving backwards - although on reflection there have been moments when I would have liked it to do so - but one keeps an open mind. And to think that, just two or three years ago, none other than the Amazing Stephen Hawking admitted publicly, while brandishing a demand for more government spending on research into "closed time-like curves", that contrary to his long-held views, he thought time-travel might be possible after all. That from the author of A Brief History of Time, who had once pointed out that the ridiculousness of the whole concept was highlighted by a singular lack of invading hordes of tourists from the future.
But there it was, last week, in hard print (all right, the Independent, if you must know): 100 scientists from numerous countries had published the results of a three-year project to demonstrate that, in our universe at least, time moves in only one direction, and that direction is forward. World-weary cynic I may be, but I felt a little twinge at that, thought I heard somewhere the dismal, muffled clunk of yet another little door being shut on the realms of the possible: on Bradburyesque dinosaur safaris into the Cretaceous; on Connecticut Yankees in King Arthur's court, on sallying forth to prevent Gavrilo Princip from firing the shot that killed Archduke Franz Ferdinand and ten million others, or to reverse the result at Flodden; on throwing a spanner into the evolutionary works by treading on a Jurassic butterfly ...
The article made for heavy going.
I read it once over a pint of 80 shilling, then again over a large black coffee, neither of which particularly lubricated its ingress into the little grey cells, as they strove to come to grips with the vagaries of charge parity time symmetry and why matter and antimatter didn't eliminate each other back at the Big Bang.
I'll spare you the gory details about kaons and antikaons, pions and neutrinos: suffice to say that, amid the temporal stramash of whizzing particles and antiparticles, I gathered that the scientists had been violating charge particle symmetry (unspeakable deed!), using high-energy accelerators.
Their conclusion was that, so far as time was concerned, antimatter was more likely to turn into matter - evidence of the irrevocable flow of time. And the reason, apparently, why our universe is a matter-dominated sort of place, though we'd all be in a right mess if it wasn't.
And that was why time travel was impossible. "You might be able to play tricks with time at the single-atom level, but not in the larger world," pronounced one of the violators.

6. More evidence – time travel ain't happening
The Independent (London) in '98
(Charles Arthur, "Science: No more back to the future; To the dismay of science fiction fans, physicists have proved time only moves forwards", November 27, L/N)

But earlier this month 100 scientists from nine countries published the results of a three-year collaborative project. It demonstrated, for the first time, that in our universe at least, time moves in only one direction.
The experiment, called CP-LEAR (Charge Parity experiment in the Low Energy Antiproton Ring), was carried out to study the differences between matter and antimatter, the "converse" of matter. Antimatter particles have the same mass but opposite charge (and other characteristics) to their matter counterparts; in theory, every matter particle has an antiparticle. The electron's counterpart is the positively charged positron, for example.
When a particle and its antiparticle meet, the two annihilate each other in a burst of light energy. What physicists therefore find strange about antimatter is its general absence in the universe. Theory suggests that the Big Bang should have created equal amounts of matter and antimatter. Why didn't they eliminate each other at the universe's birth?
"That is the big mystery," says Professor Frank Close, from the Rutherford Appleton Laboratory in Didcot. He is presently on secondment to Cern, the European Laboratory for Particle Physics in Geneva, Switzerland, which led the CP-LEAR work. Antimatter has not been found "free" in the wider universe, despite careful searches.
One suggestion is that time affects particles and antiparticles differently. Early quantum physics assumed that, like other laws of physics, subatomic reactions would be the same no matter which way time flowed. If you started with a group of particles and antiparticles with known charges and "parities" (measurable quantities such as "spin" and "flavour"), then banged them together and measured the charge and parity of the resulting particles, the totals would be the same before and after. Physicists called this "CPT symmetry" - for charge parity time symmetry.
However, physicists always want to check such assumptions with the real world. They could not run time backwards, but they could experiment with antiparticles by pretending that antiparticles were just particles moving back in time.
Testing this idea experimentally meant evaluating the charge and parity of every particle produced in thousands of high-speed particle collisions in high-energy accelerators. In 1964 a Japanese team discovered that, in some reactions, the totals differed.
This effect, known as "charge parity violation", or CP violation, centres on an electrically neutral particle called the K meson, or kaon. In most reactions, it simply broke down into three pi mesons (pions). But in a fraction of cases, it decayed into only two pions - violating CP symmetry.
The experiment put a bomb underneath the idea that time could run in either direction. For 30 years CP violation bothered physicists; they needed more powerful particle accelerators to confirm what was happening.
Finally, in 1995, a set of new experiments set out to test this, using kaons and their antiparticles, antikaons. These are short-lived particles produced by the collision of antiprotons with hydrogen atoms. (Hence the use of the Low Energy Antiproton Ring for the work.) Kaons can turn into antikaons - and antikaons can turn into kaons - until they finally decay into an electron, a pion and a neutrino. By measuring the electron's exact charge, observers can determine whether the parent was a kaon or antikaon.
In a paper published last month in the journal Physics Letters, the international team working on the CP-LEAR experiment found that antikaons turned into kaons more often than kaons turned into antikaons. In other words, with time, antimatter is more likely to turn into matter - evidence of a clock running under the fabric of the universe.
Very possibly, this difference was one of the reasons our nascent universe turned into a matter-dominated place, instead of being snuffed out in a blast of gamma rays.
Of the CP-LEAR results, Professor Close says: "This is confirmation that everything we believe about the universe holds together."
So does that mean that time travel is impossible? Yes, according to Professor Close. "The way I describe it is that while you may not be able to tell which way a film is running when you see two billiard balls colliding, you'll certainly be able to tell if you see a white ball shooting towards a scattered group of balls on a table, after which they group together into a pyramid. You'd know it's crazy. You might be able to play tricks with time at the single-atom level, but not in the larger world."

didn't think we had cards on that did you?

A2: Particle Accelerator Black Hole Impact

Not NEARLY enough energy to create a black hole – and any hole would be fleeting and couldn't consume even one photon
Webb in '02

(Stephen, Physicist at Open University of London, "If the Universe Is Teeming with Aliens... Where Is Everybody? Fifty Solutions to Fermi's Paradox and the Problem of Extraterrestrial Life", p. 128-129

The flurry of concern with the RHIC began when someone calculated that the energies involved in the experiments would be enough to create a tiny black hole. The fear was that the black hole would tunnel down from Long Island to Earth's center and proceed to devour our planet. Fortunately, as more sensible calculations quickly showed, there is essentially no chance of this happening. To create the smallest black hole that can exist requires energies about 10 million billion times greater than the RHIC can generate.'" (Even if a particle accelerator could generate such energies, the black hole it produced would be a puny thing indeed, with only a fleeting existence. It would struggle to consume a proton, let alone Earth.)

It would take a particle accelerator the size of the galaxy to create the smallest of black holes – our current technology is ten million billion times too weak
New Scientist, 99

(8-28, "A Black Hole Ate my Planet", http://www.kressworks.com/Science/A_black_hole_ate_my_planet.htm)

Within 24 hours, the laboratory issued a rebuttal: the risk of such a catastrophe was essentially zero. The Brookhaven National Laboratory that runs the collider had set up an international committee of experts to check out this terrifying possibility. But BNL director John Marburger, insisted that the risks had already been worked out. He formed the committee simply to say why they are so confident the Earth is safe, and put their arguments on the Web to be read by a relieved public. Even so, many people will be stunned to learn that physicists felt worried enough even to mull over the possibility that a new machine might destroy us all. In fact, they've been fretting about it for over 50 years. The first physicist to get the collywobbles was Edward Teller, the father of the hydrogen bomb. In July 1942, he was one of a small group of theorists invited to a secret meeting at the University of California, Berkeley, to sketch out the design of a practical atomic bomb. Teller, who was studying the reactions that take place in a nuclear explosion, stunned his colleagues by suggesting that the colossal temperatures generated might ignite the Earth's atmosphere. While some of his colleagues immediately dismissed the threat as nonsense, J. Robert Oppenheimer, director of the Manhattan Project, set up to build the atom bomb, took it seriously enough to demand a study. The report, codenamed LA-602, was made public only in February 1973. It concentrated on the only plausible reaction for destroying the Earth, fusion between nuclei of nitrogen-14. The report confirmed what the sceptics had insisted all along: the nuclear fireball cools down too far quickly to trigger a self-sustaining fire in the atmosphere. Yet in November 1975, **The Bulletin of the Atomic Scientists** claimed that Arthur Compton, a leading member of the Manhattan Project, had said that there really was a risk of igniting the atmosphere. It turned out to be a case of Chinese whispers: Compton had mentioned the calculation during an interview with the American writer Pearl Buck, who had got the wrong end of the stick. Even so, the Los Alamos study is a watershed in the history of science, for it marks the first time scientists took seriously the risk that they might accidentally blow us all up. The issue keeps raising its ugly head. In recent years the main focus of fear has been the giant machines used by particle physicists. Could the violent collisions inside such a machine create something nasty? "Every time a new machine has been built at CERN," says physicist Alvaro de Rujula, "the question has been posed and faced." One of the most nightmarish scenarios is destruction by black hole. Black holes are bottomless pits with an insatiable appetite for anything and everything. If a tiny black hole popped into existence in RHIC, the story goes, it would burrow down from Long Island to the centre of the Earth and eat our planet--or blow it apart with all the energy released. So why are physicists convinced that there's no chance of this happening? Well, the smallest possible black hole is around 10^{-35} metres across (the so-called Planck Length). Anything smaller just gets wiped out by the quantum fluctuations in space-time around it. But even such a tiny black hole would weigh around 10 micrograms--about the same as a speck of dust. To create objects with so much mass by collisions in a particle accelerator demands energies of 10^{19} giga-electronvolts, so the most powerful existing collider is ten million billion times too feeble to make a black hole. Scaling up today's technology, we would need an accelerator as big as the Galaxy to do it. And even then, the resulting black hole wouldn't be big enough to swallow the Earth. Such a tiny black hole would evaporate in 10^{-42} seconds in a blast of Hawking radiation, a process discovered by Stephen Hawking in the 1970s. To last long enough even to begin sucking in matter rather than going off pop, a black hole would have to be many orders of magnitude bigger. According to Cliff Pickover, author of **Black Holes: A Traveler's Guide**, "Even a black hole with the mass of Mount Everest would have a radius of only about 10^{-15} metres, roughly the size of an atomic nucleus. Current thinking is that it would be hard for such a black hole to swallow anything at all--even consuming a proton or neutron would be difficult."

A2: Particle Accelerator Strangelets Impact

Your strangelets scenario is a joke
Webb in '02
(Stephen, Physicist at Open University of London, "If the Universe Is Teeming with Aliens... Where Is Everybody? Fifty Solutions to Fermi's Paradox and the Problem of Extraterrestrial Life", p. 129)

So we can sleep soundly, safe in the knowledge that the RHIC will not produce a black hole. We can rest assured, too, that it will not destroy Earth through the production of strangelets — chunks of matter containing so-called strange quarks in addition to the usual arrangement of quarks."' So far no one has seen strangelets, but physicists wondered whether experiments at the RHIC might produce them. If strangelets were produced, then there is a risk they might react with nuclei of ordinary matter and convert them into strange matter — a chain reaction could then transmute the entire planet into strange matter. However, having raised the possibility of catastrophe, physicists were quick to reassure everyone. Calculations show that strangelets are almost certainly unstable; even if they are stable, the RHIC would almost- certainly not have the energy to create them; and even if they were created at the RHIC, their positive charge would cause them to be screened from interactions by a surrounding electron cloud.162

This is just stupid
New Scientist, 99
(8-28, "A Black Hole Ate my Planet", http://www.kressworks.com/Science/A_black_hole_ate_my_planet.htm)

Strangelets are chunks of matter made from "strange" quarks as well as the usual "up" and "down" types of ordinary matter. It might be possible to make them in particle accelerators like RHIC. The risk is that a strangelet might consume nuclei of ordinary matter and convert them into more strange matter, transmuting the entire Earth into a strange-matter planet. But having raised this appalling prospect, Wilczek quickly dismissed it. And quite rightly, says the world's leading expert on strangelets, Robert Jaffe of the Massachusetts Institute of Technology. "Strangelets are almost certainly not stable, and if they are, they almost certainly cannot be produced at RHIC," he says. "And even if they were produced at RHIC, they almost certainly have positive charge and would be screened from further interactions by a surrounding cloud of electrons." Every one of these steps in the argument would have to be flawed for strangelets to be a risk.

A2: Particle Accelerator Vacuum Impacts

Particle Accleration won't cause a vacuum or reverse the universe
Webb in '02
(Stephen, Physicist at Open University of London, "If the Universe Is Teeming with Aliens... Where Is Everybody? Fifty Solutions to Fermi's Paradox and the Problem of Extraterrestrial Life", p. 129-130)

The unlikely litany of catastrophes that the RHIC (and other particle accelerators) might inflict upon us does not end with black holes and strangelets. Paul Dixon, a psychologist with only a hazy grasp of physics, believes collisions at the Tevatron particle accelerator at Fermilab might trigger the collapse of the quantum vacuum state.
A vacuum is simply a state of least energy. According to current cosmological theories, the early Universe may have briefly become trapped in a metastable state: a false vacuum. The Universe eventually underwent a phase transition into the present "true" vacuum, unleashing in the process a colossal amount of energy — it is similar to what happens when steam undergoes a phase transition to form liquid water. But what if our present vacuum is not the "true" vacuum? Rees and Hut published a paper in 1983 suggesting this could be the case.is3 If a more stable vacuum exists, then it is possible for a "jolt" to cause our Universe to tunnel to the new vacuum — and the point at which the jolt occurs would see a destructive wave of energy spread outward at the speed of light. The very laws of physics would change in the wake of the wave of true vacuum.
Dixon thought that experiments at the Tevatron might cause a jolt that could collapse the vacuum. He was so worried he took to picketing Fermilab with a homemade banner saying "Home of the next supernova."164 Once again, however, we need not worry unduly about an accelerator-induced apocalypse. As Rees and Hut themselves pointed out in their original paper, through the phenomenon of cosmic rays Nature has been carrying out particle-physics experiments for billions of years at energies much higher than anything mankind can achieve.165 If high-energy collisions made it possible for the Universe to tunnel to the "true" vacuum — well, cosmic rays would have caused the tunneling to occur long ago.
The concept of an accelerator accident causing the destruction of a world (or the whole Universe, in the case of a vacuum collapse) is really a non-starter. The physics of these events is not known perfectly — that is why physicists are carrying out the research — but they are well enough known for us to realize that the doom-merchants have it wrong in this case. We have to look elsewhere for a resolution of the paradox.

Cosmic Collisions prove – your argument is moronic
New Scientist, 99
(8-28, "A Black Hole Ate my Planet", http://www.kressworks.com/Science/A_black_hole_ate_my_planet.htm)

But don't heave a sigh of relief just yet. The Brookhaven scientists have also considered an even more alarming possibility than the destruction of the Earth. Could their mighty machine trigger the collapse of the quantum vacuum? Quantum theory predicts that the Universe is filled with a seething melee of so-called vacuum energy. That might seem an unlikely threat to civilisation. After all, it's simply the average energy of the mess of particles that flit in and out of existence all around us. As the Universe expanded and cooled, that vacuum energy dropped down to the lowest possible level. Or did it? What if the Universe is still "hung up" in an unstable state? Then a jolt of the right amount of energy in a small space might trigger the collapse of the quantum vacuum state. A wave of destruction would travel outwards at the speed of light, altering the Universe in bizarre ways. It would be rather bad news for us, at least: ordinary matter would cease to exist. In 1995, Paul Dixon, a psychologist at the University of Hawaii, picketed Fermilab in Illinois because he feared that its Tevatron collider might trigger a quantum vacuum collapse. Then again in 1998, on a late night talk radio show, he warned that the collider could "blow the Universe to smithereens". But particle physicists have this covered. In 1983, Martin Rees of Cambridge University and Piet Hut of the Institute of Advanced Study, Princeton, pointed out that cosmic rays (high-energy charged particles such as protons) have been smashing into things in our cosmos for aeons. Many of these collisions release energies hundreds of millions of times higher than anything RHIC can muster--and yet no disastrous vacuum collapse has occurred. The Universe is still here. This argument also squashes any fears about black holes or strange matter. If it were possible for an accelerator to create such a doomsday object, a cosmic ray would have done so long ago. "We are very grateful for cosmic rays," says Jaffe.

Only idiotic psychologists think that this is true. Physicists – actual scientists who specialize in this field – think it's stupid.
New York Times, 98
(Malcolm W. Browne, "Wondering How the World Will End? Some Mordant Thoughts from Physics", July 14, L/N)

Among the outlandish doomsday scenarios dreamed up by some ooscientists is the possibility that the energy density of "empty" space in oour part of the universe represents a "false vacuum" – an emptiness pervaded by a certain amount of hidden energy. The menace is that there might be another vacuum with a lower energy level into which our part of the universe might tumble, losing all its protons and thereby obliterating our neck of the universal wooods, ourselves included. It has been suggested by non-physicsists, led by Paul Dixon, a psychologist at the University of Hawaii, that the powerfull Tevatron particle accelerator at Fermilab in Illinois (which collides particles together at a combined energy of two trillion electronvolts) might pack so much punch it could start a tear in our friendly space-time along with its false vacuum. Such a catastrophe, it is surmised, would propogate at the speed of light, plunging Batavia, Ill., the site of Fermilab, and the rest of the universe into non-existence. Physicists scoff at this notion, saying that the Earth is continuously peppered by cosmic rays that have energies up to 10 to the 19th power electronvolts – about 10 million times more energy than the most potent accelerator collisions – and yet our universe survives.

didn't think we had cards on that did you?

A2: Gold-Gold Collisions In Particle Acceleration A Unique Risk

Wrong, gold-gold collisions also happen naturally – it's not unique
New Scientist, 99
(8-28, "A Black Hole Ate my Planet", http://www.kressworks.com/Science/A_black_hole_ate_my_planet.htm)

But RIHC is special, goes the counter-argument, because it collides gold nuclei together. What if some subtle unforeseen physical effect makes collisions between heavy nuclei particularly dangerous? Fortunately, there are some heavy nuclei among the multitude of cosmic rays that fly through the Solar System. "We believe there are relevant cosmic ray "experiments" for every known threat," says Jaffe. "Even if one insists on gold-gold collisions, there have been enough such collisions on the surface of the Moon since its formation 5 billion years ago to assure us that RHIC experiments are safe."

A2: Gray Goo – It's Impossible

No Gray Goo – safeguards solve and waste heat means expansion would be slow and we could develop counter-measures
Webb in '02

(Stephen, Physicist at Open University of London, "If the Universe Is Teeming with Aliens... Where Is Everybody? Fifty Solutions to Fermi's Paradox and the Problem of Extraterrestrial Life", p. 127)

The young boy in Woody Allen's Annie Hall becomes depressed at the thought that the Universe is going to die, since that will be the end of every-thing. I am becoming depressed writing this section, so to cheer up myself — and any young Woodys that might be reading — I think we have to ask whether the gray goo problem is even remotely likely to arise. As Asimov was fond of pointing out, when man invented the sword he also in-vented the hand guard so that one's fingers did not slither down the blade when one thrust at an opponent. The engineers who develop nanotechnology are certain to develop sophisticated safeguards. Even if self-replicating nanobots were to escape or if they were released for malicious reasons, then steps could be taken to destroy them before catastrophe resulted. A population of nanobots increasing its mass exponentially at the expense of the biosphere would immediately be detected by the waste heat it generated. Defense measures could be deployed at once. A more realistic scenario, in which a population of nanobots increased its mass slowly, so the waste heat they generated was not immediately detectable, would take years to convert Earth's biomass into nanomass. That would provide plenty of time to mount an effective defense. The gray goo problem might not be such a difficult problem to overcome: it is simply one more risk that an advanced technological species will have to live with.

SELF-REPLICATING NANOBOTS AND GREY GOO ARE IMPOSSIBLE
Smalley in 2001

[Richard – Gene and Norman Hackerman Professor of Physics and Chemistry @ Rice University, received the 1996 Nobel Prize in Chemistry for the discovery of fullerenes – September, "Nanofallacies: of Chemistry, Love, and Nanobots," Scientific American, Vol. 285 #3]

<But how realistic is this notion of a self-replicating nanobot? Let's think about it. Atoms are tiny and move in a defined and circumscribed way--a chemist would say that they move so as to minimize the free energy of their local surroundings. The electronic "glue" that sticks them to one another is not local to each bond but rather is sensitive to the exact position and identity of all the atoms in the near vicinity. So when the nanomanipulator arm of our nanobot picks up an atom and goes to insert it in the desired place, it has a fundamental problem. It also has to somehow control not only this new atom but all the existing atoms in the region. No problem, you say: our nanobot will have an additional manipulator arm for each one of these atoms. Then it would have complete control of all the goings-on that occur at the reaction site. But remember, this region where the chemistry is to be controlled by the nanobot is very, very small--about one nanometer on a side. That constraint leads to at least two basic difficulties. I call one the fat fingers problem and the other the sticky fingers problem. Because the fingers of a manipulator arm must themselves be made out of atoms, they have a certain irreducible size. There just isn't enough room in the nanometer-size reaction region to accomodate all the fingers of all the manipulators necessary to have complete control of the chemistry. In a famous 1959 talk that has inspired nanotechnologists everywhere, Nobel physicist Richard Feynman memorably noted, "There's plenty of room at the bottom." But there's not that much room. Manipulator fingers on the hypothetical self-replicating nanobot are not only too fat; they are also too sticky: the atoms of the manipulator hands will adhere to the atom that is being moved. So it will often be impossible to release this minuscule building block in precisely the right spot. Both these problems are fundamental, and neither can be avoided. Selfreplicating, mechanical nanobots are simply not possible in our world. To put every atom in its place--the vision articulated by some nanotechnologists-would require magic fingers. Such a nanobot will never become more than a futurist's daydream. >

SELF-REPLICATING NANOBOTS ARE IMPOSSIBLE—THREE REASONS
Science in '00

[Robert F. Service, "Is Nanotechnology Dangerous?" Volume 290, Number 5496, November 24, http://www.sciencemag.org/cgi/content/full/290/5496/1526)

<Richard Smalley, a Nobel Prize-winning chemist at Rice University in Houston, Texas, says that there are several good reasons to believe that nanomachines of the sort imagined by Drexler and company can never be made. "To put it bluntly, I think it's impossible," Smalley says. As he sees it, the idea of little machines that grab atoms and assemble them into desired arrangements suffers from three faults. First, he says, it's wrong to think you can just manipulate an individual atom without handling the ones around it as well. "The essence of chemistry is missing here. Chemistry is not just sticking one atom in one place and then going and grabbing another. Chemistry is the concerted motion of at least 10 atoms." That means to move that one atom where you want it, you'll need 10 nanosized appendages to handle it along with all of its neighbors.

Which raises the second problem--what Smalley calls the "fat fingers" problem. A nanometer is just the width of eight oxygen atoms. So even if you're trying to build something hundreds of nanometers in size, "there's just not enough room" in that space to fit those 10 fingers along with everything they are trying to manipulate. Finally, there's the "sticky fingers" problem: Even if you could wedge all those little claspers in there with their atomic cargo, you'd have to get them to release those atoms on command. "My advice is, don't worry about self-replicating nanobots," says Smalley. "It's not real now and will never be in the future.">

A2: Gray Goo – It's Impossible

SELF-REPLICATING NANOBOTS ARE A SCIENFITIFC IMPOSSIBILITY—CONTRARY THOUGHTS IGNORE BASIC CHEMISTRY AND WOULD REQUIRE A LIVING ENZYME
Smalley in 03
[Rick- University Professor, Gene and Norman Hackerman Professor of Chemistry and Professor of Physics & Astronomy, 1996 Nobel Prize Winner – Chemistry and Engineering News, "Nanotechnology: Drexler and Smalley Make the Case for and Against "Molecular Assemblers'", December 1, Volume 81, Number 48, p. 37-42]

<You still do not appear to understand the impact of my short piece in Scientific American. Much like you can't make a boy and a girl fall in love with each other simply by pushing them together, you cannot make precise chemistry occur as desired between two molecular objects with simple mechanical motion along a few degrees of freedom in the assembler-fixed frame of reference. Chemistry, like love, is more subtle than that. You need to guide the reactants down a particular reaction coordinate, and this coordinate treads through a many-dimensional hyperspace.

I agree you will get a reaction when a robot arm pushes the molecules together, but most of the time it won't be the reaction you want. You argue that "if particular conditions will yield the wrong product, one must either choose different conditions (different positions, reactants, adjacent groups) or choose another synthetic target." But in all of your writings, I have never seen a convincing argument that this list of conditions and synthetic targets that will actually work reliably with mechanosynthesis can be anything but a very, very short list.

Chemistry of the complexity, richness, and precision needed to come anywhere close to making a molecular assembler--let alone a self-replicating assembler--cannot be done simply by mushing two molecular objects together. You need more control. There are too many atoms involved to handle in such a clumsy way.

To control these atoms you need some sort of molecular chaperone that can also serve as a catalyst. You need a fairly large group of other atoms arranged in a complex, articulated, three-dimensional way to activate the substrate and bring in the reactant, and massage the two until they react in just the desired way. You need something very much like an enzyme.

In your open letter to me you wrote, "Like enzymes and ribosomes, proposed assemblers neither have nor need these 'Smalley fingers.'" I thought for a while that you really did get it, and you realized that on the end of your robotic assembler arm you need an enzymelike tool. That is why I led you in my reply into a room to talk about real chemistry with real enzymes, trying to get you to realize the limitations of this approach. Any such system will need a liquid medium. For the enzymes we know about, that liquid will have to be water, and the types of things that can be synthesized with water around cannot be much broader than the meat and bone of biology.

But, no, you don't get it. You are still in a pretend world where atoms go where you want because your computer program directs them to go there. You assume there is a way a robotic manipulator arm can do that in a vacuum, and somehow we will work out a way to have this whole thing actually be able to make another copy of itself. I have given you reasons why such an assembler cannot be built, and will not operate, using the principles you suggest. I consider that your failure to provide a working strategy indicates that you implicitly concur--even as you explicitly deny--that the idea cannot work.

A few weeks ago I gave a talk on nanotechnology and energy titled "Be a Scientist, Save the World" to about 700 middle and high school students in the Spring Branch ISD, a large public school system here in the Houston area. Leading up to my visit, the students were asked to write an essay on "Why I Am a Nanogeek." Hundreds responded, and I had the privilege of reading the top 30 essays, picking my favorite five. Of the essays I read, nearly half assumed that self-replicating nanobots were possible, and most were deeply worried about what would happen in their future as these nanobots spread around the world. I did what I could to allay their fears, but there is no question that many of these youngsters have been told a bedtime story that is deeply troubling.

You and people around you have scared our children. I don't expect you to stop, but I hope others in the chemical community will join with me in turning on the light, and showing our children that, while our future in the real world will be challenging and there are real risks, there will be no such monster as the self-replicating mechanical nanobot of your dreams.>

Self-Replicating nano-bots are impossible
Smalley in 03
[Rick- University Professor, Gene and Norman Hackerman Professor of Chemistry and Professor of Physics & Astronomy, 1996 Nobel Prize Winner – Chemistry and Engineering News, "Nanotechnology: Drexler and Smalley Make the Case for and Against "Molecular Assemblers'", December 1, Volume 81, Number 48, p. 37-42]

<But where does the enzyme or ribosome entity come from in your vision of a self-replicating nanobot? Is there a living cell somewhere inside the nanobot that churns these out? There then must be liquid water present somewhere inside, and all the nutrients necessary for life. And now that we're thinking about it, how is it that the nanobot picks just the enzyme molecule it needs out of this cell, and how does it know just how to hold it and make sure it joins with the local region where the assembly is being done, in just the right fashion? How does the nanobot know when the enzyme is damaged and needs to be replaced? How does the nanobot do error detection and error correction?

And what kind of chemistry can it do? Enzymes and ribosomes can only work in water, and therefore cannot build anything that is chemically unstable in water. Biology is wonderous in the vast diversity of what it can build, but it can't make a crystal of silicon, or steel, or copper, or aluminum, or titanium, or virtually any of the key materials on which modern technology is built. Without such materials, how is this self-replicating nanobot ever going to make a radio, or a laser, or an ultrafast memory, or virtually any other key component of modern technological society that isn't made of rock, wood, flesh, and bone?

I can only guess that you imagine it is possible to make a molecular entity that has the superb, selective chemical-construction ability of an enzyme without the necessity of liquid water. If so, it would be helpful to all of us who take the nanobot assembler idea of "Engines of Creation" seriously if you would tell us more about this nonaqueous enzymelike chemistry. What liquid medium will you use? How are you going to replace the loss of the hydrophobic/hydrophilic, ion-solvating, hydrogen-bonding genius of water in orchestrating precise three-dimensional structures and membranes? Or do you really think it is possible to do enzymelike chemistry of arbitrary complexity with only dry surfaces and a vacuum?

The central problem I see with the nanobot self-assembler then is primarily chemistry. If the nanobot is restricted to be a water-based life-form, since this is the only way its molecular assembly tools will work, then there is a long list of vulnerabilities and limitations to what it can do. If it is a non-water-based life-form, then there is a vast area of chemistry that has eluded us for centuries.>

A2: Gray Goo – It's Impossible

SELF-REPLICATING NANOBOTS ARE IMPOSSIBLE—CHEMISTRY PROVES
NPR in '04
["Scientists are hoping nanotechnology will lead to new research", January 19, L/N]

<Mr. RICHARD SMALLEY (Chemist): What the fantasy is in nanobots is you can radio on down to them and tell them to build yourself a spaceship, but it can't work. It can't do the chemistry.
KESTENBAUM: Inevitably, he says, you'd end up reinventing something that works like a living cell, but that's far more complicated than anything humans have ever made, and cells are limited in what they can do.
Mr. SMALLEY: In fact, the chemistry that's available in living cells is actually pretty restricted, and it's restricted because there's water around. And so you can't make everything biologically. You can't make a copper wire. You can't make steel. You can't make crystalline silicon. In fact, the list of things you can't make pretty much reads like the list of modern technology.
KESTENBAUM: Smalley wrote recently to a colleague of Merkle's, quote, "There will be no such monster as the self-replicating mechanical nanobot of your dreams." Even so, the nanotechnology community is worried that this vision will scare people. Partly as a pre-emptive strike, it was organized discussions on nano ethics.>

GREY GOO IS NONSENSE – LIFE ITSELF PROVES
Electronics News in '06
(Steven Keeping, "Researchers Debate Nano Future", February, L/N)

Quantum nanoscience researchers are having to refute nanotechnology's negative "grey goo" publicity before turning to the serious business of progress towards a practical quantum computer.
At an international conference held in Noosa, Qld. at the end of January, scientists were at pains to dispel the myths while getting to grips with more serious issues such as who will control the technology, and how to protect publicly-funded Australian intellectual property (IP).
Grey goo is a hypothetical scenario in which self-replicating nanobots devour everything else, leaving just detritus behind.
"It's complete and utter nonsense," says Professor Gerard Milburn, convener of the Sir Mark Oliphant Conference on Frontiers of Quantum Nanoscience. "It's not science. It's not even remotely feasible."
He pointed out that life itself has been replicating uncontrolled for the past 2-3 billion years, without any individual lifeform consuming all others.

GREY GOO IS IMPOSSIBLE—DREXLER HAS CONCEDED
New Scientist in '04
("U-turn on goo", June 12, L/N)

GREY goo is no more. Eric Drexler, the futurist who dreamed up the vision of self-replicating nanomachines spreading across the planet has publicly repudiated his idea.
In his 1986 book Engines of Creation, Drexler suggests that microscopic machines might one day be able to manipulate individual molecules to build any desired structure. If such a machine contained its own blueprint and could scavenge raw materials, it could take over the planet in a chain reaction of self-replication, he warned.
"The self-replicating machine idea has had a profound effect on nanotechnology, or rather its perception - mostly for the bad," says Mark Welland, editor-in-chief of the journal Nanotechnology.
Now, in an article in the June issue of Nanotechnology, Drexler says that nanofactories will be desktop-sized machines that can manipulate large numbers of molecules. Although such a factory could be directed to build a copy of itself, says Drexler, it would not be able to do so on its own. And neither would it be able to spread around the planet, Hollywood style, eating everything its path.

No one will be able to build self-replicating nanobots
Freitas in 2000
(Robert, Research Scientist, Some Limits to Global Ecophagy by Biovorous Nanoreplicators, with Public Policy Recommendations, http://www.foresight.org/nano/Ecophagy.html)

However, biovorous nanorobots capable of comprehensive ecophagy will not be easy to build and their design will require exquisite attention to numerous complex specifications and operational challenges. Such biovores can emerge only after a lengthy period of purposeful focused effort, or as a result of deliberate experiments aimed at creating general-purpose artificial life, perhaps by employing genetic algorithms, and are highly unlikely to arise solely by accident.

A2: Gray Goo – It's Impossible

THE SELF-REPLICATING NANOBOTS THEORY WOULDN'T WORK AS DREXLER HAD CLAIMED
Freitas in 2000

(Robert, Research Scientist, Some Limits to Global Ecophagy by Biovorous Nanoreplicators, with Public Policy Recommendations, http://www.foresight.org/nano/Ecophagy.html)

<3.0 Exponential Replication Rate
Ignoring thermal pollution considerations for the moment (Section 6.0), in theory an optimally designed and geographically uniformly distributed population of replibots could increase the mass of their own population at the expense of the biosphere, via self-replication, according to the simple relation [19]:
Mrepl = Minite(t/t) (1)
for maximum exponential growth, where t is elapsed time (sec), t is generation cycle or replication time (sec), Minit (kg) is initial nanorobot mass at time t = 0, and Mrepl (kg) is the replicator mass at time t, where Mrepl 0.23 Mbio. In order to achieve this rate, each completed component of the unit currently being built must be put to full productive use immediately, instead of waiting for the final completion of the unit. There are a few design configurations where something close to this can be achieved efficiently, but as a practical matter and to retain simplicity it will usually be preferable to await the completion of a unit before pressing it into replicative service, a mode of operation called discrete replication, in which case the exponential term in Eqn. 1 should be replaced with 2(t/tdiscrete) -- which, all else equal, will be a slightly slower function. (Discrete replication can be faster than pure exponential replication only if tdiscrete < t ln(2).) Replicating populations limited to activity only at the perimeter of the expansion wave, or in regions of high replibot number density, may achieve only polynomial growth rates [19], which are even slower.
In order to estimate t = tconv, the time required for total conversion of the biosphere to replibots plus waste sludge, we must first estimate t. Drexler [4] has calculated that a readily-envisioned multistage molecular manufacturing system could manufacture its own mass in t ~ 1000 seconds. However, nanoreplicators need not be capable of general purpose manufacturing, but may be optimized solely for replication of their own substance. A molecular manipulator designed by Drexler [4] that is suitable for molecular assembly pick-and-place operations consists of 4 million atoms excluding support base, power, control, and other necessary structures, and is designed to perform ~106 atomic-precision molecular pick-and-place operations per second, assuming arm-tip movement at 1 cm/sec over minimal 10-nm arcs each cycle. Freitas [6] estimates that a basic autonomous nanoassembler using two Drexler manipulator arms and incorporating a simple onboard nanocomputer might require at least ~70 million atoms (~1 gigadalton), suggesting a minimum replication time t ~ 100 seconds. (The smallest independently viable cells are thought to have a molecular weight of order ~1 gigadalton, e.g., minimum diameter ~140 nm[72, 73].)
It is difficult to imagine how an ecophagic replicator capable of successfully assimilating natural biomatter of all existing varieties could be much simpler than this. However, it is possible that molecular manipulators might be slewed at speeds up to ~100 cm/sec, perhaps giving t ~ 1 sec, but at the cost of steeply rising energy dissipation [4] which greatly increases waste heat production and system operating temperatures, and reduces nanoreplicator reliability due to larger thermally-excited displacements, thermal damage rates, and phonon-mediated drag [4]. For example, a 10-nm force sensor measuring 10 pN at an operating temperature of 300°K has a 0.2% probability of erroneous measurement; this probability jumps to 3% at 500°K and 16% at 1000°K [4]. Hence, t ~ 1 sec appears to be a rather aggressive and probably unachievable lower limit. >

NANOBOTS WOULDN'T BE ABLE TO FIND ENOUGH ENERGY TO CREATE GREY GOO
Freitas in 2000

(Robert, Research Scientist, Some Limits to Global Ecophagy by Biovorous Nanoreplicators, with Public Policy Recommendations, http://www.foresight.org/nano/Ecophagy.html)

<5.0 Energy and Materials Requirements Limitations
The need for energy is another fundamental limit on the speed at which biospheric conversion can take place. During ecophagy, the richest source of energy is likely to be chemical energy derived from the assimilation of biomolecules found in the biosphere. For example, a biomass density of ~10 kg/m2 on land [20, 21] typically having ~107 J/kg of recoverable chemical energy [6] implies an available energy density of ~108 J/m2 at the terrestrial surface. By comparison, visible-spectrum sunlight at noon on a cloudless day (Isolar ~ 100-400 W/m2 [6]) may provide at most ~107 J/m2 over the course of an 8-hour work day. Other sources of scavengable energy such as radionuclides are much scarcer (Section 2.0). Note that the complete combustion in air of a mass of glucose equal to Mbio would consume ~5.3 ×1015 kg O2, only 0.5% of the ~1.1 ×1018 kg of oxygen contained within Earth's ~21% O2 atmosphere. Hence oxygen-dependent ecophagy will not be oxygen-limited.
Interestingly, diamond has the highest known oxidative chemical storage density because it has the highest atom number (and bond) density per unit volume. Organic materials store less energy per unit volume, from ~3 times less than diamond for cholesterol, to ~5 times less for vegetable protein, to ~10-12 times less for amino acids and wood [6]. Since replibots must build energy-rich product structures (e.g. diamondoid) by consuming relatively energy-poor feedstock structures (e.g., biomass), it may not be possible for biosphere conversion to proceed entirely to completion (e.g., all carbon atoms incorporated into nanorobots) using chemical energy alone, even taking into account the possible energy value of the decarbonified sludge byproduct, though such unused carbon may enter the atmosphere as CO2 and will still be lost to the biosphere. >

SELF-REPLICATING NANOBOTS WOULD RELEASE WASTE HEART WHICH WOULD CHANGE THE ENVIORONMENT MAKING IT TO DIFFICULT TO CONTINUE REPLICATION
Freitas in 2000

(Robert, Research Scientist, Some Limits to Global Ecophagy by Biovorous Nanoreplicators, with Public Policy Recommendations, http://www.foresight.org/nano/Ecophagy.html)

6.0 Ecophagic Thermal Pollution Limits (ETPL)
<A more restrictive limitation on the maximum speed of biomass conversion to nanomass is the generation and release of process waste heat into the environment during ecophagy. If there are too many nanoreplicators working all at once, the waste heat they generate can begin to warm up the environment. In some cases, the environment could become so hot that the biospheric conversion process can no longer proceed.
In the crude analysis that follows, we assume that after some number of prior replication cycles, the replibots have converted roughly half of the biosphere to nanoreplicator mass. In the next and final replication cycle, the energy extractable from the remaining half of the global biomass will be consumed as each existing nanorobot replicates itself once more for the last time, thus promptly doubling the existing population and completing the global conversion of biomass into nanomass. >

A2: Gray Goo – It's Impossible

NANO HAS ALWAYS BEEN AROUND – NO REASON TO WORRY
The Spectator in '03
(Roger Highfield, "Small cause for concern", June 14, L/N)

<But only now that these warnings have reached the not insignificant ears of Prince Charles have the popular media become excited by the dark side of nanotechnology. One tabloid wrote, 'Thousands of women are using controversial nanotechnology in skincare products without realising it.'
Please don't panic just yet. Nature has been manipulating atoms since 200 million years after the Big Bang, when fully fledged chemistry was born with the first stars. She remains the supreme nanotechnologist: the Sars virus and BSE prions are exactly the kind of ruthlessly efficient, self-replicating molecular machines that worry the Prince. Ultraviolet-blue bird plumage exploits nanostructured keratin rods. Even the Prince's body is brimming with natural nanobots molecular machines such as the ribosome that translates his genetic code into proteins.
The deliberate practice of nanotechnology by people is a more recent development, but just as common. Our Stone Age ancestors mixed and matched nature's building blocks when they cooked food. Perhaps the first intentional use dates back to 4500 BC, with glass-making in Mesopotamia. Though they did not realise it, alchemists also sought systematic ways to move atoms en masse. The ability to make those 'unnatural materials' that so worry Sir Jonathon is today called chemistry.
What is new is that our ability to manipulate and study matter has made great leaps. Two decades ago, I was laboriously depositing single layers of molecules for my doctorate. Today, scientists can even shift atoms. But, boy, is it slow! In one milestone experiment, Don Eigler of IBM worked 22 hours non-stop to write the company trademark with 35 xenon atoms, cooled to near absolute zero to stop them jiggling about.
These advances do not, however, alter the fact that the potential risks of nanotechnology remain indistinguishable from those of chemistry and biotechnology. Although nanoterrorism sounds more chilling than bioterrorism, the difference is lost on me. I should make clear, though, that it's not all Prince Charles's and Jonathon Porritt's fault. Scientists themselves are partly to blame for the nanoangst. They rebranded chemistry as nanotechnology to make it sexier and more likely to attract funds, while knowing that it is daft to define a technology by a length scale. Would it help, for example, to use the term centitechnology (centi - a hundredth of a metre) to describe bullets, bolts, keys, pills and marbles?>
Silly though it may be, we seem now to be stuck with nanofanatics. Thanks to the hype, even Tony Blair has become one. He told the Royal Society last year, 'Visionaries in this field talk about machines the size of a cell that might, for example, identify and destroy all the cancerous cells in a body.'
While multinational companies salivate over such visionary applications, the multinational environmental movement becomes ever more worked up about nanocatastrophies. Even though there are many serious and immediate problems facing humankind, mostly driven by overpopulation, nanotechnology is becoming the new green milch-cow, one that will swell the movement's coffers with subscriptions from an anxious public to buy more banners, jumpsuits and stuffed penguins for consciousness-raising stunts.

NANOTECHNOLOGY IS HUNDREDS OF YEARS AWAY IF IT'S EVEN POSSIBLE—DREXLER GREY GOO THEORIES ARE CRAZY
Stix in 2001
(Gary, Scientific American's special projects editor, scientific American, September)

The danger comes when intelligent people take Drexler's predictions at face value. Drexlerian nanotechnology drew renewed publicity last year when a morose Bill Joy, the chief scientist of Sun Microsystems, worried in the magazine Wired about the implications of nanorobots that could multiply uncontrollably. A spreading mass of self-replicating robots-what Drexler has labeled "gray goo"-could pose enough of a threat to society, he mused, that we should consider stopping development of nanotechnology. But that suggestion diverts attention from the real nano goo: chemical and biological weapons.
Among real chemists and materials scientists who have now become nanotechnologists, Drexler's predictions have assumed a certain quaintness; science is nowhere near to being able to produce nanoscopic machines that can help revive frozen brains from suspended animation. (Essays by Drexler and his critics, including Nobel Prize winner Richard E. Smalley, appear in this issue.) Zyvex, a company started by a software magnate enticed by Drexlerian nanotechnology, has recognized how difficult it will be to create robots at the nanometer scale; the company is now dabbling with much larger micromechanical elements, which Drexler has disparaged in his books [see "Nanobot Construction Crews," by Steven Ashley, on page 84].

A2: Gray Goo – Blue Goo Solves

GOODBOTS WILL BE ABLE TO DEFEAT THE SELF-REPLICATING NANOBOTS
Freitas in 2000
(Robert, Research Scientist, Some Limits to Global Ecophagy by Biovorous Nanoreplicators, with Public Policy Recommendations, http://www.foresight.org/nano/Ecophagy.html)

<8.4 Malicious Ecophagy
More difficult scenarios involve ecophagic attacks that are launched not to convert biomass to nanomass, but rather primarily to destroy biomass. The optimal malicious ecophagic attack strategy appears to involve a two-phase process. In the first phase, initial seed replibots are widely distributed in the vicinity of the target biomass, replicating with maximum stealth up to some critical population size by consuming local environmental substrate to build nanomass. In the second phase, the now-large replibot population ceases replication and exclusively undertakes its primary destructive purpose. More generally, this strategy may be described as Build/Destroy.
During the Build phase of the malicious "badbots," and assuming technological equivalence, defensive "goodbots" enjoy at least three important tactical advantages over their adversaries:
Preparation -- defensive agencies can manufacture and position in advance overwhelming quantities of (ideally, non-self-replicating) defensive instrumentalities, e.g., goodbots, which can immediately be deployed at the first sign of trouble, with minimal additional risk to the environment;
Efficiency -- while badbots must simultaneously replicate and defend themselves against attack (either actively or by maintaining stealth), goodbots may concentrate exclusively on attacking badbots (e.g., because of their large numerical superiority in an early deployment) and thus enjoy lower operational overhead and higher efficiency in achieving their purpose, all else equal; and
Leverage -- in terms of materials, energy, time and sophistication, fewer resources are generally required to confine, disable, or destroy a complex machine than are required to build or replicate the same complex machine from scratch (e.g., one small bomb can destroy a large bomb-making factory; one small missile can sink a large ship). >

BLUE GOO SOLVES GREY GOO
Arrius in 2003
[Quintus – staff writer for Strategy Page – 11/6, "Nanotechnology: Apocalyptic Development?," www.strategypage.com]

<One suggested solution to the problem of "grey goo" is "blue goo" - special "policeman" nanotech devices designed specifically to recognise and disassemble molecular machines which are out of control. The blue goo would be deliberately released into the world, and allowed to replicate to a pre-determined level, there to wait and monitor the activity of other nanotech and act in case of runaway self-replicators.
It's a physically possible solution to the problem - but the human race has a long history of developing technologies which destroy the environment well before they develop the technologies to control them. With nanotech, we will only get one chance - the first accidental release could be the end of all life on earth.>

A2: Gray Goo – Won't Destroy Universe (Wipeout Specific)

Grey Goo wouldn't destroy the universe even if it happened
Webb in '02

(Stephen, Physicist at Open University of London, "If the Universe Is Teeming with Aliens... Where Is Everybody? Fifty Solutions to Fermi's Paradox and the Problem of Extraterrestrial Life", p. 127)

This solution to the paradox, which has been seriously proposed, suffers the same problem as many other solutions: even if it can occur it is not convincing as a "universal" solution. Not every ETC will succumb to the gray goo.

Nano-Tech Good

NANOTECHNOLOGY WOULD PERMENANTLY SOLVE WAR – IT WOULD MAKE EVEN DETERRENCE OBSELETE
Gudbrum in 97
[Mark – Superconductivity Researcher @ the University of Maryland – "Nanotechnology and International Security," http://www.foresight.org/Conferences/MNT05/Papers/Gubrud/index.html]

The nanotechnic era will be fundamentally different from the era in which nuclear weapons were developed and came to dominate the possibilities for global violence.

The bombed-out cities of the Second World War, and the nuclear holocausts of our imagination, have persuaded rational minds that there can be no expectation of a meaningful victory in total war between states armed with hundreds of deliverable nuclear weapons. From that point of view, war is obsolete, at least direct and open war between great powers.

Nanotechnology will carry this evolution to the next step: deterrence will become obsolete, as it will not be possible to maintain a stable armed peace between nanotechnically-armed rivals. The implications of this statement stand in sharp contradiction to the traditions of a warrior culture and to the assumptions that currently guide policy in the United States and in its potential rivals.

NANOTECHNOLOGY WOULD PROVIDE FREEDOM AND ALL THE NECESSITIES OF LIFE
Drexler in 86
(Eric – Nanotechnologist – *Engines of Creation*, http://www.e-drexler.com/d/06/00/EOC/EOC_Chapter_15.html]

<Nanotechnology will open new choices. Self-replicating systems will be able to provide food, health care, shelter, and other necessities. They will accomplish this without bureaucracies or large factories. Small, self-sufficient communities can reap the benefits.

One test of the freedom a technology offers is whether it frees people to return to primitive ways of life. Modern technology fails this test; molecular technology succeeds. As a test case, imagine returning to a stone-age style of life - not by simply ignoring molecular technology, but while using it. >

NANOTECHNOLOGY WOULD CREATE A UTOPIA
Drexler in 86
(Eric – Nanotechnologist – *Engines of Creation*, http://www.e-drexler.com/d/06/00/EOC/EOC_Chapter_15.html]

<This, then, is the size of the future's promise. Though limits to growth will remain, we will be able to harvest solar power a trillion times greater than all the power now put to human use. From the resources of our solar system, we will be able to create land area a million times that of Earth. With assemblers, automated engineering, and the resources of space we can rapidly gain wealth of a quantity and quality beyond past dreams. Ultimate limits to lifespan will remain, but cell repair technology will make perfect health and indefinitely long lives possible for everyone. These advances will bring new engines of destruction, but they will also make possible active shields and arms control systems able to stabilize peace.

In short, we have a chance at a future with room enough for many worlds and many choices, and with time enough to explore them. A tamed technology can stretch our limits, making the shape of technology pinch the shape of humanity less. In an open future of wealth, room, and diversity, groups will be free to form almost any society they wish, free to fail or set a shining example for the world. Unless your dreams demand that you dominate everyone else, chances are that other people will wish to share them. If so, then you and those others may choose to get together to shape a new world. If a promising start fails - if it solves too many problems or too few-then you will be able to try again. Our problem today is not to plan or build utopias but to seek a chance to try.>

Nano-Tech Good

NANOTECHNOLOGY SOLVES ALL DISEASES AND PAIN
Spence in 99
[Bill, 12/99, Alcor Life Extension Foundation, http://www.stii.dost.gov.ph/infoscience/jun2001/jun01_6.htm]

<Supermedicine
Nanotechnology can have innumerable applications in various fields including industry, agriculture, energy, ecology, and health, among others. Supermedicine, including cryonics (roughly, freezing the terminally with the intention of reviving it in the future when nanotechnology already has the cure for the illness) excites more people now than anything else.
Building on the atomic scale, mechanical computers with the power of a mainframe can be manufactured so small, that several hundred will fit inside the space of a biological cell. If one combines microscopic motors, gears, bearings, plates, sensors, power and communication cables, etc. with powerful microscopic computers, one has the makings of a new class of materials, programmable microscopic smart materials that can be used in medicine. Medical nanite can patrol the body, armed with a complete knowledge of a person's DNA, and dispatch any foreign invaders. Such cell sentinels will form an artificial immune system and immunity to not only the common cold, but also AIDS and any future viral or bacterial mutations.
The nanites can do what the plastic surgeon does, only better. No pain, no bruising, and results overnight. People can sculpt their own bodies. People who feel they were born with the wrong gender can really make the change, taking on the full attribute of the opposite sex. Men can bear children.
Imagine having one's body and bones woven with invisible diamond fabric. Simple calculations show, a properly engineered body reinforcement net (possibly bio-diamond composite) woven with nanites smaller than a human cell can increase tolerance to "G" forces to the point that one can fall out of a building and walk away unhurt and alive. In the event of a fire or a chemical spill, should the air become toxic, microscopic diamond vessels just ten billionths of a meter wide, pressurized with 1,000 atmospheres of pure oxygen could sense oxygen levels in the blood and provide respiration requirements of the body for hours. Fatal accidents can be walked away from, thanks to a range of safety devices possible only with nanotechnology.
Even more astounding, nano computers ad manipulators will be small enough to insert into cells, without compromising cellular function ad perform a myriad novel functions. One particularly interesting function is to take an inventory of the host cell's structures using the cell's DNA as a blueprint. Should a foreign nasty element arrive, something outside the inventory as stated by the cell's DNA, the cell sentinel will destroy the invader before it has time to cause damage. The nano computer will not need to know what disease the invader represents, it will not matter. If it is not included in the DNA code, it is destroyed.
Viruses, prions (microscopic protein particle similar to a virus but lacking in nucleic acid), parasites and bacteria continue to mutate ad produce new diseases which man's immune system may or may not handle. In theory, a nano cell sentinel can make the body immune to any present or future infectious diseases. Imagine a child growing up disease-free.
There will be no more painful childbirth. With mature nanotechnology capable of cellular manipulation, there is no reason a woman should experience agonizing hours of labor at the miraculous moment of birth. Dilation can be controlled by the mother without pain. Birth will no longer be traumatic with nanotechnology.
There will be nanites for cellular structural repairs (radiation damage, etc.) ad genetic modifications, like disabling biological death gene clocks. >

NANOTECHNOLOGY IS INEVITABLE AND SOLVES EVERYTHING
Joy in 2000
[Bill – co-founder of Sun Microsystems – April, "Why the Future Doesn't Need Us," *Wired Magazine*]

<A subsequent book,Unbounding the Future: The Nanotechnology Revolution, which Drexler cowrote, imagines some of the changes that might take place in a world where we had molecular-level "assemblers." Assemblers could make possible incredibly low-cost solar power, cures for cancer and the common cold by augmentation of the human immune system, essentially complete cleanup of the environment, incredibly inexpensive pocket supercomputers - in fact, any product would be manufacturable by assemblers at a cost no greater than that of wood - spaceflight more accessible than transoceanic travel today, and restoration of extinct species.

I remember feeling good about nanotechnology after readingEngines of Creation. As a technologist, it gave me a sense of calm - that is, nanotechnology showed us that incredible progress was possible, and indeed perhaps inevitable. If nanotechnology was our future, then I didn't feel pressed to solve so many problems in the present. I would get to Drexler's utopian future in due time; I might as well enjoy life more in the here and now. It didn't make sense, given his vision, to stay up all night, all the time.>

Nano-Tech Good

We have to develop nanotech – stopping now would just allow bad people to get it – on balance allowing free technology advancement is better than stifling it
R21 in 2002
[May 20, http://www.r21online.com/archives/000007.html]

<Nanotech packs something for everyone to worry about. Yet, while Joy's concerns are worth considering, and his call for discussion appropriate, his quest for relinquishment is not. The opinions of brilliant technologists notwithstanding, it is not at all clear that we are headed for Armageddon. And if we are, the path to dystopia has always been at the hands of humans bent on control, using technology as their tool, not the other way around. Joy's solution requires a global unanimity impractical today and very likely impossible ever. Even if "good" scientists held back from certain areas of research, this may simply put that knowledge exclusively in the hands of the "bad" scientists who may use it for destruction, with no one capable of countering them. Knowledge among virtuous may be the only thing to protect us from the wicked.
There is the chance that the evil potential of nanotech is unleashed unwittingly by those with good intentions. But given the amount of introspection on this topic (The Foresight Institute, for example, has developed a list of self-governing principles in the development of nanotechnology), it is far more likely that it will be evil that will beget evil. With that being the case, who knows what virtues nanotech could bring to the world in the intervening decades before it can become a danger? Joy seeks to determine for the rest of us that the costs of this technology may outweigh the benefits, but it is simply impossible for one individual to tell whether the reverse may be the case.
Despite the horror stories, the development of technologies, though not without costs, has overwhelmingly proved a net positive force for the state of humanity. While human suffering continues, as a global society we live longer, healthier, and wealthier lives, thanks not exclusively, but in great part due to innovation. Thomas Malthus was wrong, and while Joy or some other neo-Malthusian may be right in the future, history suggests that the surer path to dystopia is not to pursue knowledge, but to ban it.>

NANOTECHNOLOGY SOLVES WORLD HUNGER AND IS KEY TO MEDICINE AND THE ENVIRONMENT
Chen in 2002
[Andrew, "The Ethics of Nanotechnology," http://www.actionbioscience.org/newfrontiers/chen.html]

It would not take much of a leap, then, to imagine disassemblers dismantling garbage to be recycled at the molecular level, and then given to assemblers for them to build atomically perfect engines. Stretching this vision a bit, you can imagine a Star Trek type replicator which could reassemble matter in the form of a juicy steak, given the correct blueprints and organization of these nanomachines.
Nanotechnology could also benefit medicine and the environment.
Just given the basic premises of nanotechnology, you can imagine the vast potential of this technology. Some of its more prominent benefits would be:
Manufacturing
> Precision Manufacturing
> Material Reuse
> Miniaturization
Medicine
> Pharmaceutical Creation
> Disease Treatment
> Nanomachine-assisted Surgery
Environment
> Toxin Cleanup
> Recycling
> Resource Consumption Reduction
Doctors could repair our bodies microscopically with nanomachines. Along with all the obvious manufacturing benefits, there are also many potential medical and environmental benefits. With nanomachines, we could better design and synthesize pharmaceuticals; we could directly treat diseased cells like cancer; we could better monitor the life signs of a patient; or we could use nanomachines to make microscopic repairs in hard-to-operate-on areas of the body.3,12 With regard to the environment, we could use nanomachines to clean up toxins or oil spills, recycle all garbage, and eliminate landfills, thus reducing our natural resource consumption.

Nanotechnology solves death and illnesses
Zey in 94
(Michael – Ph.D in sociology, executive director of the Expansionary Institute – "Seizing the Future," p. 147)

Nanotechnology will also play a major role in postoperative healing. Quite simply, repair machines will help the heart grow fresh muscle by resetting cellular control mechanisms. Stroke victims will be helped to regenerate fresh brain tissue even where there has been significant damage.
The ultimate goal here is not merely to cure disease, but rather to establish lifetime health, perhaps even immortality. This will transpire when we have achieved a complete understanding of the molecular structure of healthy tissue. Then we will have the knowledge to diagram, as if were, the structure of a healthy heart cell or a healthy liver and transfer to tiny machines the accurate information about that organ's molecules, cells, and tissues.

Nano-Tech Inevitable

NANOTECHNOLOGY IS INEVITABLE
Perkins in 95
[Anthony, October, "The Incredible Shrinking World," *Red Herring Magazine,* http://www.redherring.com/Article.aspx?a=4041]

<Eric Drexler currently heads the Palo Alto-based, non-profit organization called The Foresight Institute that, in his words, "gathers and distributes information and holds conferences on technologies that are clearly going to have a large impact on society, with a particular focus on nanotechnology." This makes sense, since Mr. Drexler was the first to introduce the word nanotechnology to the English language in 1981 when he was still a graduate student at MIT. Nanotechnology, also known as advanced molecular manufacturing, is the science of creating machines at an atomic level. "Somebody recently completed a computer-based study on the use of the term nanotechnology, and the results followed a pretty steep exponential curve after the publication of my first book. I think the curve is getting even steeper as we speak," Mr. Drexler told The Herring at lunch recently. People generally take one of two distinct views on nanotechnology. Some view it as a serious scientific endeavor that could lead to the creation of atomically precise manufacturing systems, where programmed atoms serve as building blocks, and productivity and data through-put could conceivably increase a trillion-fold. According to this school of thought, nanotechnology could provide, among other things, a personal computer that will pack a trillion transistors, with a current CPU's power in every transistor. Others view nanotechnology as a novelty that a few scientists are a little over-enthusiastic about because it works on a nanometer scale. And scientists all seem to love really, really small, or really, really big things.
Whether the nanorevolution will occur is a moot question. But we do know from a recent conversation with Intel founder Gordon Moore, that the photolithography technology used to build today's semiconductors will ultimately hit the wall, and the number of transistors you can fit on a single chip will reach its limit. What then? Let us introduce you to Eric Drexler--he just might have the answer.
The Herring: So what turned you on to nanotechnology, anyway? >

NANOTECH INEVITABLE
R21 in 2002
[May 20, http://www.r21online.com/archives/000007.html]

<Things are moving fast, however. Nearly 500 companies are researching and developing nanotechnology, including such behemoths as IBM, Motorola, Hewlett Packard, Lucent, Hitachi, Mitsubishi, NEC, Corning, Dow Chemical, and 3M as well as scores of start-ups, looking to raise money from nearly 75 different venture capital firms who have made bets on nanotech. A financial bubble, while not in the immediate future, will come eventually. >

A2: Anti-Gravity Weapons

1. No impact – your evidence is talking about the effect of EM radiation being harnessed for infinite energy, not weapons use

2. The author of the article actually admits that Cook is insane and it's only a conspiracy theory
Rogers 02
(Adam, writer for The Slate, Oct. 18 2002, http://www.slate.com/id/2072733/ "Feeling Antigravity's Pull")

Unfortunately, Cook strains his own credibility somewhat. A couple of weeks after his *Jane's* piece appeared, Cook's book on antigravity research, *The Hunt for Zero Point*, came out. In it, he claims that the Nazis built an antigravity device during World War II. Its absence from present-day science, Cook says, implies a vast "black" world of secret antigravity aircraft that might explain the UFOs people see over Area 51. He's a careful investigative reporter, but once you start talking about UFOs and Nazi antigravity you're not far from hidden tunnels under the White House full of lizard-men disguised as Freemasons.
Even without Nazis, there are plenty of reasons to doubt Podkletnov. My e-mails to the account listed on his recent articles (not peer-reviewed) went unanswered. Even more problematic, I can't find the institution he lists as his affiliation in Moscow. "Eugene always expressed his worries that others could copy his work, although as far as I know he never applied for a patent," Giovanni Modanese, a collaborator of Podkletnov's at the University of Bolzano in Italy, wrote in an e-mail (using a Western version of Podkletnov's first name). "Nonetheless, at the scientific level if one wants a confirmation by others and a successful replication, one must give all the necessary elements." Well, yeah. Modanese says that the current version of the device, now called an "impulse gravity generator," is simpler and could be built "by a big-science team of people expert in superconductivity." A Boeing spokesperson didn't respond to follow-up questions. So, either there's nothing going on here, or it's an X-File.
And the science? Ten years is a long time to go without replication. Combine that with Podkletnov's cagey behavior and it's enough to make even sci-fi geeks like me lose hope. But like the core of any good conspiracy, antigravity research has the ring of plausibility. One of the outstanding problems in physics and cosmology today involves the existence of so-called dark matter and dark energy. They're by far the main constituents of matter in the universe, and nobody knows what they're made of—researchers have only inferred their existence from gravitational effects. Coming up with a new theory of how gravity works might explain that, though it'd be a scientific revolution on a par with relativity. "Changing gravity is in the cards," says Paul Schechter, an astronomer at MIT. "But so far no one's been able to do better than Einstein." Still, Einstein worked in a lowly patent office. Ron Koczor works for NASA.

3. You're in a double bind –
a. Podkletnov actually did make this anti-gravity machine froom your article, and it did nothing to destroy the sun or the moon which proves your impacts false, or
b. He's a crazy ass who is lying and these anti-gravity machines don't exist.

Anti-gravity can't happen – mainstream physics agrees
Scotland on Sunday in '96
(Geraldine Murray, "Anti-gravity theory takes a tumble", September 22, L/N)

PLANS for an anti-gravity device, which would revolutionise space travel and defy Newton's established third law of motion, have been brought back down to earth with a bump.
Russian scientist Dr Eugene Podkletnov has withdrawn a paper describing the machine which was due to be published in a leading physics journal next month. The device is thought to reduce the weight of any object suspended over it by up to 2% and, if Podkletnov's claims are true, could be one of the most radical scientific discoveries in history.
Controversy surrounds Podkletnov's decision, which followed queries over the identity of the paper's co-author and a denial by Tampere University in Finland, where the Russian says he is based, that they knew anything about the anti-gravity research.
But the paper succeeded in passing the scrutiny of three referees appointed by the Journal of Physics-D: Applied Physics to find flaws in Podkletnov's work. Tests are thought to have ruled out other possibilities for the machine's effect such as air flow or magnetic fields.
Most physicists are traditionally sceptical about anti-gravity devices and doubts are already being voiced, despite the paper's acceptance by the respected journal. Podkletnov told New Scientist last week that he stood by his claims. "This is an important discovery and I don't want it to disappear," he said.

Podkletnov is inspired by Star Trek – he's an idiot
New Scientist in '02
(Howard Medhurst, "Putting spin on it. . . .", February 9, L/N)

The anti-gravity machine described in Podkletnov's 1992 paper seems to be almost identical to the gravity generators used on the starship Enterprise, as described on page 144 of "Star Trek: The Next Generation Technical Manual," by Rick Sternbach and Michael Okuda, copyright Paramount Pictures 1991 - except that the "Star Trek" devices have larger superconducting discs and spin a lot faster. Of course, that can only be a coincidence, can't it ?

A2: Anti-Gravity Weapons

Cook and anti-gravity theorists are crackpots – they use no citations, no proof and are borderline Nazi sympathizers
McClure, No Date Given
(Kevin, Review of "The Hunt for Zero Point", Written after 2001, http://www.forteantimes.com/review/huntzero.shtml)

The 'Zero Point' for which Cook hunts is the point where anti-gravity technology achieves the escape of an object from gravity's effect: where it flies because there is nothing to prevent it doing so. He finds it, oddly, in the achievements of Nazi scientists during World War II, though they have never been replicated since and Cook – a professional, and award-winning, writer on aerospace matters – never tells us what their technology was, or how it worked.
Any attempt to replicate Cook's quest is bound to be frustrated. Four of his primary sources are, without explanation, given false names, including one 'Lawrence Cross', supposedly a former Janes aerospace journalist, "now a bureau chief for a rival publication in Australia". 'Cross' feeds him a raw, uncritical version of the 'Nazi UFO' material I debunked in 'Phoney Warfare' in Fortean Studies 7, and apparently says "It's been around for decades, long enough to have been given a name. In the trade, we call it the Legend." Most of this material actually comes from former Nazis or later sympathisers, and I've never heard it called "the Legend".
Equally frustrating is Cook's decision to do without references or an index. There is much waffle here, and the story jumps backwards and forwards. Rumours are presented without noting their likely status, and unless a reader has spent time researching the same material from other sources, it would be impossible to make an objective assessment of his assertions. His style sometimes descends from the merely credulous to the downright odd. Without pursuing the question further, one of Cook's mysterious sources ends a chapter by saying "They were trying to build a f—king time machine". More disturbingly, Cook sets out a detailed fantasy of how the (supposed) scientists working on the (supposed) anti-gravity (or time) machine would have been shot and buried by the SS, in line with "a paragraph or two from the execution manual it had drawn up for the Holocaust." This tasteless passage seems inappropriate, at best.
For a man who tells me he has 20 years' experience as a journalist, Nick Cook is remarkably trusting. In particular, he trusts the strange version of history put to him by one Igor Witkowski, a Pole who volunteered to assist him in his research. I spoke to Cook, who describes Witkowski as a "former defence journalist", but was unaware of the evidence that Witkowski seems to be a ufologist who is interested in crop circles and the similarities between the technologies of the Nazis and the Aliens. He did not know what Witkowski's self-published tracts are about, having made no attempt to translate them from the Polish. In fact, Witkowski has put out six separate items titled something like Hitler's Supersecret Weapons, advertised along with other publications in the crashed saucer/paranormal field. It is at least possible that, in volunteering his assistance to Cook, Witkowski had an agenda of his own to publicise.
Witkowski, too, has a vital, unnamable source. Supposedly, a "Polish government official" phoned him, inviting him to view documents and take notes about the development and concealment of extraordinary Nazi technology, as given in a record of "the activities of a special unit of the Soviet secret intelligence service."
Convinced of the veracity of both Witkowski and the source, Cook was driven around Eastern Europe to see evidence of 'The Bell', a supposed experimental device with two cylinders spinning in opposite directions, which Witkowski said glowed blue and destroyed plants, birds, animals, and sometimes humans. Dangerous tasks connected with its operation were, apparently, performed by "concentration camp prisoners from Gross-Rosen." Cook seems to have been inside two constructions which had contained versions of The Bell, but publishes no photographs of this key evidence.
Accepting the reality of dazzling, futuristic Nazi technology, Cook locates a scientist to match. The name he chooses, supplied in 'The Legend' according to 'Lawrence Cross', is Viktor Schauberger, an Austrian forester who features regularly in pro- and neo-Nazi versions of the 'Nazi UFO' mythos, but nowhere in mainstream scientific history.
I'll be returning to the peculiar creation of the Schauberger-as-Saucer-Builder myth in detail in a forthcoming issue of FT, but suffice it to say that Cook's version of the tale probably originates in 1975, in a book by a prominent Holocaust revisionist. Although Cook visits the Schauberger archives, he does not confirm the tale told him by 'Cross'. And while Cook concludes that "via Schauberger, the Nazis had been deeply involved – no question – in what can only be described as flying saucer technology", we are not allowed to see any pages of Schauberger's diaries or letters to support this extraordinary claim.
In the end it is the lack of evidence, and of traceable sources, that renders this book almost valueless as either history or science. Worse, it may unwittingly be delivering political propaganda, glorifying fictional Nazi achievements, of which I am sure neither author nor publisher would approve.

Podkletnov's experiment on gravity shielding is bunk – no one has repeated it
BBC in '02
("Boeing tries to defy gravity", July 29, http://news.bbc.co.uk/1/hi/sci/tech/2157975.stm)

Dr Podkletnov claims to have countered the effects of gravity in an experiment at the Tampere University of Technology in Finland in 1992.
The scientist says he found that objects above a superconducting ceramic disc rotating over powerful electromagnets lost weight.
The reduction in gravity was small, about 2%, but the implications - for example, in terms of cutting the energy needed for a plane to fly - were immense.
Scientists who investigated Dr Podkletnov's work, however, said the experiment was fundamentally flawed and that negating gravity was impossible.

Physicists agree anti-gravity is a delusion – experiments proving it are subject to measurement error
Busienss Week in '97
(Otis Port, "ANTIGRAVITY? WELL, IT'S ALL UP IN THE AIR", February 17, L/N)

Floating on air? It's possible. Just chill a ceramic superconductor below 90K (-300F) and place it on a magnet. The superconductor will levitate. It's called the Meissner effect, and it might one day lead to an "antigravity" machine.
John H. Schnurer, director of physics engineering at Antioch College in Yellow Springs, Ohio, thinks he might have taken a first step in that direction last fall. After chilling a 1-inch-diameter superconducting disk, he threw a switch that sent an electrical current surging through a set of coils positioned around the disk. Above the disk was a plastic sample hanging from one end of a homemade balance scale containing no metal parts. The plastic sample rose ever so slightly -- corresponding to an apparent 5% loss in the weight of the sample. "Great fun," said Schnurer -- his restrained way of shouting "Eureka!" WEAK FORCE. Many physicists are sure antigravity is a delusion. Even if it does exist, it can't be more than one-millionth as strong as gravity, says Eric G. Adelberger, a professor of physics at the University of Washington who studies gravity. And because gravity itself is such a weak force, tiny magnetic fields and temperature changes can cause spurious results. Adelberger says it's crucial to control temperatures to one-thousandth of a degree -- way beyond the scope of Schnurer's setup.

A2: Proton Disintegration Weapons

1. No impact – your authors are insane, the only way to destroy a proton is to destroy the atom it is contained in, which makes your scenario non-unique – nuclear weapons prove why this wouldn't trigger your impacts

2. The weapons fail – the neutrino positron pairing necessary for escalation is too rare
American Physical Society 99 (APS, The Disintegration of High Energy Protons, http://prola.aps.org/abstract/PR/v51/i12/p1037_1)

The coupling between light and heavy particles assumed in the Fermi theory of β-decay makes it possible for high energy protons in passing through matter to transfer a considerable fraction of their energy to electrons and neutrinos. If we suppose that this coupling is a maximum for relative energies of the light and heavy particles of the order $\hbar c/R$, with R the range of nuclear forces, and is small for much higher relative energies, the most important process which occurs, for sufficiently energetic protons, can be pictured as a sort of photodisintegration of the proton by the contracted Coulomb field of a passing nucleus, the proton changing into a neutron and emitting a positron and a neutrino. With a coupling of the type described, and of the magnitude required by the proton-neutron forces, processes involving more than one pair of light particles will be relatively rare. The cross section for the disintegration of a proton of energy E is found to be of the order $2\pi(\hbar/Mc)RZ^2\alpha^2 \ln^2 (E/Mc^2)$, and is very small, even for heavy nuclei. The mean energy given to the positron per disintegration is of the order $2(\hbar c/R)(E/Mc^2)/\ln (E/Mc^2)$. The positrons emitted in these disintegrations can account in order of magnitude for the incidence of showers observed under thick absorbers.

3. There's no basis in physics – if there was a reaction that could break down all protons without introducing energy, it would disobey the second law of thermodynamics (insert science?) and destroy the entire universe, which is disproved by every one of trillions of stars

4. We can't disintegrate protons artificially – the lifetime is too long
Dursely 99 (Physics major, "Towards Grand Unification", http://molaire1.club.fr/e_unification.html)

Because this theory groups together **5 particles** (the electron, the neutrino and the d antiquarks of each colour) in a fundamental quintuplet. The other particles would be grouped in a decuplet. The symmetry of the GUT would permit the invariance of nature by the permutation of a lepton (electron, neutrino...) with a quark: To put it plainly, leptons and quarks of the quintuplet would be transformable, one to another, and these transitions could be possible by the intermediary of new bosons called **leptoquarks**. These leptoquarks would then be bosons carrying a colour charge and a fractional electric charge. This theory would permit explanation of the troubling fact that the value of the negative electric charge (Q= -1) of an electron corresponds to the same positive value (Q= +1) of the proton. This theory predicts an appalling event: the **proton**, symbol of stability of matter, should have a **limited lifetime**! This lifetime would be **1031yrs**; knowing that the Universe was born around 1010 years ago, there is still some spare time, phew! Enormous swimming-pool proton disintegration detectors have therefore been constructed: A proton emits two photons g and a positron e+ when it disintegrates; now the positron emits a blue luminous cone in water (**Cerenkov effect** for the connoisseurs) which photo-multipliers can detect. Alas, for the moment, no positive results have been announced, which rends this GUT theory much less solid than the electroweak theory.

5. The weapon has already been used with no impact, and future development is too expensive
Global News Wire 01 (Russian TV Examines Latest Cutting-Edge Weaponry, Lexis)

It took a year for a joint U.S.-U.K. team of 50 to set up one shot. Creating the proton beam requires the electrical power needed to light a small town, if only for a few moments. LANL's cost alone was about $600,000 excluding the expense of the beam. At that rate, a full 100-minute feature would cost $36 trillion.

A2: A-Life

A-Life is ridiculous – machines can never be like humans
Zey in '00
(Michael, Professor of Management at Montclair State University, "The Future Factor: The Five Forces Transforming Our Lives and Shaping Human Destiny", p. 231-233)

Researchers who predict that robots and computers will achieve human capabilities base their contentions on their belief that soon these machines will not only compute but also "think." For decades science fiction novels and movies have featured smart robots with almost human-like thinking abilities. The movies 2001 and the recent Bicentennial Man predict a future of thinking machines.
Can the computer, no matter how complex or massive, ever think in the sense that humans do? Such feats as Deep Blue's victory over Kasparov have cybernetic scientists and technicians murmuring that we are on the verge of creating a thinking machine to challenge the human species' monopoly on real intelligence. However, many in the cybernetic community express grave doubts over whether such machines actually perform human-like thinking. Marvin Minsky, MIT professor emeritus who is credited with initiating the Artificial Intelligence (AI) movement over 35 years ago, put such proficiency in perspective. According to Minsky, "Deep Blue might be able to win at chess, but it wouldn't know to come in from the rain." 10
Minsky's comment cut to the very heart of the thinking machine debate. Deep Blue's circuits, wiring, and program, its entire "being," if we can apply such a term to this contrivance, knows nothing except how to play chess. Concepts like "rain" do not even exist in Deep Blue's memory banks. Nor could it even imagine that the rain's overwhelming moisture could impair its circuits, or fashion a strategy to avoid such a misfortune. In addition, skeptics repeatedly remind us that human intelligence created Deep Blue. Yet, instead of celebrating Deep Blue's victory as a testimony to human intelligence, the AI community congratulates the machine for a job well done.
Actually, this debate has already been settled in favor of humankind. Cambridge University physicist Roger Penrose combines information science, cognitive psychology, and physics to make a tightly constructed case against the possibility that computers can ever achieve human intelligence. In two books, The Emperors' New Mind and Shadows of the Mind, Penrose argued that the computer can never be conscious, and thus truly intelligent. 11 When our brains operate, we juggle many different thoughts and thought patterns before zeroing in on one unified pattern that becomes a conscious thought. Some physical mechanism must exist that helps us achieve, and maintain, this pattern of multiple simultaneously existing "protothoughts" before we focus in on the final thought. Penrose claims that this mechanism acts "non-locally." That is, some aspects of these thought patterns would have to act more or less at the same instant at widely separated locations of the brain, rather than spreading out relatively slowly, neuron by neuron.
The genius of Penrose's theory is the way he applies quantum physics to the operation of the brain. His basic point is that before a thought, or the neural signals that constitute thought, enters our consciousness, it exists in a "quantum wave state." At the threshold of consciousness, the "wave-thoughts" then "collapse" or coagulate into a single ordinary thought.
If, as Penrose claims, such quantum mechanical phenomena are the operating principles behind human consciousness, the brain functions in a way that no mechanical device, computer or otherwise, can ever replicate. Computing devices, artificial neural networks, cannot simulate quantum mechanical phenomena.12 Penrose's theory seems to prove that no matter how complex or sophisticated a computer or computer network is it will never achieve consciousness. And if our smart machines can never reach consciousness, they will never be said to truly think!13
Donald Norman, VP of research at Apple and psychology professor at the University of California does not believe that in the foreseeable future computers and robots will come to mimic and/or surpass people. People and computers operate along completely different principles. According to Norman, the power of biological computation, that is, the human brain, emerges from "a large number of slow, complex devices—neurons—working in parallel through intricate electrical-chemical interactions."14 All this hardwiring enables the human to think in amazingly complex, abstract ways. On the other hand, computers have no problem finding square roots instantaneously, or adding large columns of eight-digit numbers without hesitation. The computer's ability to perform math with ease and dexterity results from its multitudinous, high-speed devices following binary logic. Errors in the operation of any of the underlying components are avoided either by careful design to minimize failure rates or through error-correcting coding in critical areas.
Because of the computer's speed and accuracy, Norman says, we accord computers positive traits such as precise, orderly, undistractible, unemotional, and logical and label humans vague, disorganized, distractible, emotional, and illogical. According to Norman, we have our priorities backward. To appreciate humankind's natural superiority, he says, let us label humans creative, flexible, attentive to change, and resourceful and stigmatize computers as dumb, rigid, insensitive to change, and unimaginative.

A-life impossible – language integration is based on physical experience that robots lack
Miyakawa 03
(January 1, Mikiko, writer for Daily Yomiuri, "Yes, they're cute – Will they think someday?" first paragraph on ROBOTS ARCHIVE, http://www.aaai.org/aitopics//newstopics/robot3.html)

Is it possible for robots to have minds like human beings? Prof. Hiroshi Tsukimoto of Tokyo Denki University attempted to answer this controversial question by focusing on robots' capability of understanding language in his book titled 'Robotto no Kokoro' (Robot's Mind). In considering this issue, ... While many scientists claim that computers will become able to understand and use languages just like people, Tsukimoto, an expert on artificial intelligence, believes it will be impossible for computers to do so as they have no bodies. The professor claims that the comprehension of languages involves 'functional physical movement.' In other words, understanding of words is associated with images built up through one's physical experiences, he said."

A2: A-Life

Robots would revere human kind and not destroy us
Kurzweil 01 (Ray, June 18, http://www.kurzweilai.net/meme/frame.html?main=/articles/art0212.html?, developer of the omni-front OCR, the first print-to-speech reading machine, the first CCD flat-bed scanner, the first text-to-speech synthesizer, the first music synthesizer capable of creating orchestral sounds, founder of nine businesses, member of the National Inventors Hall of Fame, recipient of the 1999 National Medal of Technology (nation's highest tech honor). Basically, he knows his robots.)

What do emotions have to do with intelligence? In my view, our emotional capacity represents the most intelligent thing we do. It's the cutting edge of human intelligence, and as the film portrays, it will be the last exclusive province of biological humanity, one that machines will ultimately master as well. By the way, if David wishing to become "a real boy" sounds like a familiar fairy tale, the movie makes the allusion and metaphor of Pinocchio explicit. Even early in his development, David is sufficiently appealing that he wins the sympathies of the Flesh Fair spectators, much to the dismay of the master of ceremonies, who implores the audience to "not be fooled by the talent of this artistry." In the third conception of machines that the movie presents, we see entities that are supremely sublime. I've always maintained that we will ultimately change our notion of what it is to be a machine. We now regard a machine as something profoundly inferior to a human. But that's only because all the machines we've encountered are still a million times simpler than ourselves. But that gap is shrinking at an exponential rate, and the movie examines what I believe will be the last frontier: mastering our most noble emotions, a capability displayed by only one human in the movie and sought by at least one machine. I won't give away the movie's ending by revealing whether David is successful in his quest, but I will say that at one point he does display a decidedly inhuman degree of patience.It was also my feeling that the very advanced entities we meet later in the movie are displaying a noble character that is life-affirming in the Spielbergian sense. I have also maintained that future AI's will appreciate that they are derivative of the human-machine civilization, and will thereby revere their biological ancestors. This view is supported in Spielberg's conception of the most advanced machines that we meet in the film.

Advanced AI is impossible – we can't understand the complexities of how our own brains work, let alone how to build them
Drexler 86 (Engines of Creation "Thinking Machines" http://www.e-drexler.com/d/06/00/EOC/EOC_Chapter_5.html, K. Eric)

There seems to be only one idea that could argue for the impossibility of making thought patterns dance in new forms of matter. This is the idea of *mental materialism* - the concept that mind is a special substance, a magical thinking-stuff somehow beyond imitation, duplication, or technological use. Psychobiologists see no evidence for such a substance, and find no need for mental materialism to explain the mind. Because the complexity of the brain lies beyond the full grasp of human understanding, it seems complex enough to embody a mind. Indeed, if a single person could *fully* understand a brain, this would make the brain less complex than that person's mind. If all Earth's billions of people could cooperate in simply watching the activity of one human brain, each person would have to monitor tens of thousands of active synapses simultaneously - clearly an impossible task. For a person to try to understand the flickering patterns of the brain as a whole would be five billion times more absurd. Since our brain's mechanism so massively overwhelms our mind's ability to grasp it, that mechanism seems complex enough to embody the mind itself.

Machines can't have original intent, only derived intent – proves humanity superior
Papazian 92 (Dennis R., Ph.D. in International studies, does projects in new technology, St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, May 1992 http://www.umd.umich.edu/dept/armenian/papazian/robots.html)

A fundamental question is: Can man hope (or fear) that he can create machines which will become more intelligent than he? The traditional answer of philosophy is that machines, indeed, cannot be more intelligent than people simply because man is the creator and the machine the created. They supported this view with the proposition that only humans have "original intent" while machines can only have "derived intent." Only time will settle this question; but, hopefully, man still must be the judge. One thing is now clear, that in performing specific and limited tasks, present machines are--even now--more dependable than most people; yet while in dealing with complex matters, these machines can seem rather stupid and inept.

A2: A-Life

Machine programming can't handle situations it's not programmed for – there's zero intuition
Papazian 92
(Dennis R., Ph.D. in International studies, does projects in new technology, St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, May 1992 http://www.umd.umich.edu/dept/armenian/papazian/robots.html)

Furthermore, there is a difference between a machine doing the work of an intelligent person and true intelligence. Computers can now defeat all but grandmasters at chess, they can do your income tax from questions you answer, and they can deliver your mail within a building. These specialized programs and machines, however, cannot at the same time deal with life processes. The mail delivery "robot" would continue on its rounds even if an accidental release of poison gas would empty a building of all its occupants. This circumscribed "intelligence" of the robot, consequently, has been dubbed "artificial intelligence," or "specialized intelligence," to distinguish it from true human or "life intelligence," much less "creative intelligence." Those who have been on the forefront of creating machine intelligence have observed "how easy the 'hard' things were to do, and how hard the 'easy' things." The application of a machine to certain complex tasks, which often may exceed human ability to equal, can be contrasted with the inability of a machine to comprehend a nursery rhyme or to leave a building in case of fire.

Even if A-Life intelligence is good it's not transferrable which makes it useless
Papazian 92
(Dennis R., Ph.D. in International studies, does projects in new technology, St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences, May 1992 http://www.umd.umich.edu/dept/armenian/papazian/robots.html)

Computers programmed to capture human expertise, to replicate logic and experience, also have significant but limited use. A program to prescribe medicine for bacterial infection may do so better than most physicians, but they cannot distinguish between an infected woman and one in the pains of childbirth. The answer at present, of course, is to have humans work closely with machines to take advantage of the best elements of both, the machine's logic and memory, and the person's "common sense." Rather than replacing people, these expert systems make people of modest intelligence equal, in certain tasks, to those who are brilliant and have vast experience. Thus we see here the seeds of profound changes in the way people work and the potential benefit for society.Such successes, however, may conceal the fact that machine intelligence is not transferable. If a program is devised to maximize investments in the stock market by the manipulation of futures, it cannot ipso facto be "intelligent" enough to solve problems of another sort. Unlike human intelligence and learning, machine intelligence cannot be easily transferred to new and unexpected tasks.

A-Life can't choose between balanced alternatives which is a key aspect of life – they'd fail
Chandler 02
(Keith, creator of Mental Realism, and how many people can say they created something with a name like that? Also been published in peer-reviewed journals more times than God. "The Android Myth", page 64)

I cannot help but wonder what choice of behavior an artificial intelligence, programmed with the same set of background beliefs or worldview that are assumed in *Hamlet*, would make for the hapless Prince of Denmark. How would it compute its way out of his dilemma? Even more to the point, how would it acquire existential concerns of its own that led to the necessity of choosing between evenly balanced alterantives, something humans have to do all the time. What the first three epigraphs tell us is that human thinking proceeds from our *existential condition*, our *aliveness*. It would be funny if it were not so sad to see Ray Jackendoff offering a tentative list of what he calls "affects" which are intended to explain certain characteristics of visual processing, such as hallucinations, which do not follow the normal rules. These affects are described in terms of binary oppositions (op. cit.: 305-308):

A2: Type-II Civilization

Type II civilizations are immortal – they are key to solving any natural disaster even novas
Kaku in '99
(Michio, Professor of Physics at City University of New York, "Visions: How Science Will Revolutionize the 21st Century", p. 326-327)

By the time a civilization has reached Type II status, however, it will become immortal, enduring throughout the life of the universe. Nothing known in nature can physically destroy a Type II civilization. A Type II civilization has the ability to fend off scores of astronomical or ecological disasters by means of the power of its technology. Potentially disastrous meteor or comet impacts can be prevented by deflecting away any cosmic debris in space which threatens to hit its planet. On a scale of millennia, ice ages can be averted by modifying the weather—e.g., by controlling the jet stream near its polar caps or perhaps making micro-adjustments to the planet's spin.
Because the planet's engines produce large amounts of heat, it requires a highly sophisticated waste management and recycling system. However, with centuries of experience in managing and recycling its wastes, it will not face catastrophes caused by the collapse of its environment.
Perhaps the greatest danger faced by a Type II civilization is posed by an eruption of a nearby supernova, whose sudden burst of deadly X-rays could fry nearby planets. But by monitoring its nearby stars, a Type II civilization will have centuries in which to build space arks capable of carrying its peoples to colonies on nearby solar systems if they detect that one of its nearby stars is dying.

Type II civilization is key to solve the big chill which causes extinction
Kaku in '04
(Michio, Professor of Physics at City University of New York, Astrobiology Magazine, "How Advanced Could They Be?" April 26, http://www.astrobio.net/news/modules.php?op=modload&name=News&file=article&sid=939&mode=thread&order=0&thold=0)

There is also the possibility that a Type II or Type III civilization might be able to reach the fabled Planck energy with their machines (10^19 billion electron volts). This is energy is a quadrillion times larger than our most powerful atom smasher. This energy, as fantastic as it may seem, is (by definition) within the range of a Type II or III civilization.
The Planck energy only occurs at the center of black holes and the instant of the Big Bang. But with recent advances in quantum gravity and superstring theory, there is renewed interest among physicists about energies so vast that quantum effects rip apart the fabric of space and time. Although it is by no means certain that quantum physics allows for stable wormholes, this raises the remote possibility that a sufficiently advanced civilizations may be able to move via holes in space, like Alice's Looking Glass. And if these civilizations can successfully navigate through stable wormholes, then attaining a specific impulse of a million seconds is no longer a problem. They merely take a short-cut through the galaxy. This would greatly cut down the transition between a Type II and Type III civilization.
Second, the ability to tear holes in space and time may come in handy one day. Astronomers, analyzing light from distant supernovas, have concluded recently that the universe may be accelerating, rather than slowing down. If this is true, there may be an anti-gravity force (perhaps Einstein's cosmological constant) which is counteracting the gravitational attraction of distant galaxies. But this also means that the universe might expand forever in a Big Chill, until temperatures approach near-absolute zero. Several papers have recently laid out what such a dismal universe may look like. It will be a pitiful sight: any civilization which survives will be desperately huddled next to the dying embers of fading neutron stars and black holes. All intelligent life must die when the universe dies.

Accountability checks – this type of energy wouldn't be available just for anyone to control – the same way nuclear weapons use is checked now, Type II weapons use would be checked in the future. Democracy ensures anyone with the ambition to destroy the sun will never come to power.

Timeframe – the transition to a type II civilization would take thousands of years, we aren't even Type I yet
Kaku 99 (Michio, Henry Semat Professorship in Theoretical Physics at CUNY, Ph.D. from the University of California at Berkely Radiation Laboratory, Visions: How Science will Revolutionize the 21st Century http://books.google.com/books?vid=ISBN0192880187&id=VQcCV1VuT_cC&pg=PA326&lpg=PA326&dq=%22type+II+civilization%22&sig=y_8X2c0RBRLiQKZua_Ge610hxXQ&hl=en)

The transition to a type II civilization, which can utilize and manipulate the power of the sun, may take several thousand years, based on the geometric growth of technology. A type II civilization could colonize the solar system and perhaps a few neighboring ones, mine the asteroid belts, and begin to build gigantic machines that can manipulate the greatest energy source in the soolar system: the sun. (The energy needs of a type II civilization would be so large that people would have to mine the sun.)
The transition to a type III civilization, which can harness the resources of a galaxy, stretches our imagination to the limit. A type III civilization could master forms of technology that can only be dreamed of now, such as interstellar travel. Perhaps the most revealing glimpse at what a type III civilization might be like can be found in Isaac Asimov's *Foundation* series, which used the entire galaxy as a stage.
Given this perspective, which spans hundreds of thousands of years of technological development, we have made rapid progress in grasping the fundamental laws of nature within just three hundred years of Newton's original theory of gravity.
It is difficult to conceive how our civilization, with its limited resoources, eventually will make the transition to a Type I civilization and then exploit the full potential of the unified field theory. But Newton and Maxwell, in their lifetimes, probably also never realized that civilization would one day have the resources to send spaceships to the moon or to electrify cities with gigantic electrical plants.

No Aliens – General

Scientific consensus is on our side – no intelligent life beyond earth
Financial Times in '00

(Clive Cookson and Victoria Griffith, "Our Odyssey ends here: Man's quest for self-discovery is at a dead-end with the acceptance that we are alone in space", December 30, L/N)

Yet, since the film was first shown in 1968, scientific opinion has gradually shifted away from the belief in smart aliens. Where science moves, the public usually follows. This may seem an odd statement, considering the number of recent media reports about extraterrestrial life. Signs of water on Mars and Europa, a moon of Jupiter, have encouraged speculation about alien creatures.
Yet the type of life astronomers talk about these days is "dumb", not intelligent. The great hope of Nasa's Mars missions is to find evidence of microbes, living or dead. Martian bacteria would certainly be an important find, but they are a big step down from the little green men of earthlings' imagination.
Even veterans of SETI, as the Search for Extraterrestrial Intelligence is known, are beginning to sound more sceptical. Frank Drake, chairman of the SETI Institute in California, has dreamt of discovering life on other planets for 40 years. Every day, he and his colleagues attempt to pick up radio signals from other planets. Every day, they go home empty-handed.
"There may be no complex organisms out there," says Drake. "The chances of tool-bearing organisms who could send out a signal are even more remote. There is intelligent life in the oceans, for example, but the whales and dolphins wouldn't be able to communicate with another planet."
Astronomers' growing scepticism about intelligent life on other planets is fuelled partly by changes in thinking about Darwin's theory of evolution. Kubrick dedicates the first quarter of 2001 to a segment called "The Dawn of Man". The movie explores the notion that alien intervention 4m years ago transformed apes from vegetarian victims into tool-bearing carnivores, kick-starting their evolution into human beings.
While the film's notion of evolutionary "progress" is vague, Kubrick's Dawn of Man sequence reflects the famous Darwinian idea that apes gradually became more upright and more intelligent until they turned into modern homo sapiens. This view allows humans to see themselves at the pinnacle of the evolutionary tree - so far. Who knows what kind of superior beings may lie on the evolutionary path ahead?
Just a few years after the movie's debut, however, a new twist on Darwinism radically altered this view. In 1972 palaeontologist Stephen Jay Gould and his colleague Niles Eldredge developed the theory of "punctuated equilibria", according to which the most important evolutionary changes are not a gradual progression but radical and swift.
Research in geology and palaeontology since then has emphasised the random nature of such biological shifts. Species are formed not by the movement to greatness but by a series of "accidents". If the evolutionary tape were to be rewound a thousand times, nothing like human beings would appear again. Had the dinosaurs not been wiped out by a cataclysmic event, mammals would have been a mere footnote in the evolutionary bible. And if human beings are merely an "accident" - a small twig on the evolutionary tree, as Gould likes to say - then the likelihood that creatures like ourselves would exist on other planets seems very remote indeed.
At the same time, some astronomers say the conditions in which intelligent life evolved on Earth are extra-ordinary enough to make it likely that we are alone in our galaxy, if not in the universe.
In their influential book Rare Earth (Springer, Pounds 17), Peter Ward and Donald Brownlee of the University of Washington list the factors that make Earth so special: Its distance from the sun has ensured the existence of liquid water for 3.5bn years. It has the right mass to retain atmosphere and oceans. Plate tectonics built land masses. Jupiter, its giant neighbour, has protected Earth from too many life-extinguishing collisions with asteroids and comets, while allowing a few to punctuate the evolutionary equili-brium. Its orbit around the sun is stable. There is enough carbon to support life but not to allow runaway greenhouse heating. Radiation levels promote genetic change without causing lethal damage.

No Aliens – General

Theoretical research confirms reliable empirical evidence – we are alone
Gonzalez in '98
(Guillermo, Astronomer at University of Washington , Society, "Extraterrestrials: A modern view", July/August, Volume 35, Issue 5, Proquest)

Having answered the question, "Where are they?" (answer: "we are all there is"), the next natural question is, "Why?" To answer this, we can try to determine the probability of ETI based on the known laws of astronomy, biology, chemistry, and physics. I will call this the theoretical approach. The most reliably determined factors have to do with the most basic requirements for life (e.g., stars as sources of the chemical elements and energy for biochemical reactions, and protection of the biosphere from frequent bombardment from comets and asteroids). The number of astronomical/geophysical phenomena recognized as having a significant influence on life has greatly increased in the last three decades. Here is a list of such factors (the most important ones) organized according to the (sometimes approximate) decade each was first discussed in the scientific literature:

In the 1960s, the critical factors were thought to be: 1) Distance from parent star; 2) Type of parent star; 3) Unsuitability of most multiple star systems; 4) Parent star must belong to the "Population I" class (having a similar composition as the sun). In the 1970s, the critical factors were thought to be: 5) Danger posed by nearby supernovae. 6) Plate tectonics an essential ingredient in regulating the CO^sub 2 ^cycle, and hence the mean global temperature.

As our knowledge increased in the 1980s, new factors thought to play a role, including: 7) Danger posed by passage through giant molecular cloud core; 8) Destructive power of cometary or asteroidal impact; 9) Requirement of small range of oscillation of the Solar System perpendicular to Galactic plane (if it is too large, we will lose the protection of the interstellar gas and dust from ionizing radiation and the comet influx rate will be greater); 10) The Solar System is located very close to corotation radius in the Milky Way (results in minimum number of passages through spiral arms);11) A better understanding of the astrophysical sources of the chemical elements in the Milky Way places constraints on the timing and location of habitable worlds (e.g., the galactic abundance gradient makes it less likely that terrestrial planets can form in the metal-poor outer regions of the Milky Way); 12) Size of a planet important in maintaining an atmosphere and plate tectonics for long periods of time; 13) Danger posed by active galactic nucleus (AGN) outbursts; 14) The physical characteristics of a terrestrial planet (location, mass, rotation period, obliquity) have significant stochastic components resulting from the precise steps followed in their formation. Hence, very similar initial conditions may lead to a very different planetary system. This means that one would not necessarily find a habitable planet orbiting another star that is identical to the Sun in every way.

In the 1990s, as our understanding increased still further, several new potential factors were discovered, including: 15) Necessity of several giant planets in proper orbits (low eccentricity, low inclination, certain specific spacing) to regulate the cometary flux in the inner Solar System; 16) Requirement of a large natural satellite to minimize the Earth's obliquity variations; 17) Ubiquity of super-massive black holes in the nuclei of most nearby large galaxies (including our own); these are believed to fuel AGN outbursts 18) The planetary magnetic field plays an important role in protecting a planetary atmosphere from being stripped away too quickly by the stellar wind from the parent star; 19) Danger posed by gamma ray bursts if one occurs nearby; 20) Destruction of protoplanetary disks around stars forming near massive young stars as revealed in the Orion Nebula by the Hubble Space Telescope.

There are other timing considerations in many of the factors listed above. As the Sun's luminosity increased during the last 4.5 billion years, the atmosphere's CO^sub 2^ content has dropped, maintaining moderate surface temperatures. Probably within the next few hundred million years, CO^sub 2^ reduction will be incapable of maintaining tolerable surface temperatures (because there will be no more CO^sub 2^ in the atmosphere). In about 1.5 billion years the Earth's obliquity variations will likely become large and chaotic. On a larger scale, the amplitude of a star's oscillation perpendicular to the Galactic plane increases on a I billion year time scale (this is both predicted from theoretical models and observed among nearby stars). There are some other important factors not yet discussed in the literature as they relate to habitability. Some of these include: 1) There are timing constraints imposed by the need of a sufficiently high concentration of longlived radioisotopes to drive plate tectonics for several billion years (we are likely living near the epoch with the highest concentration of long-lived radioisotopes in the interstellar medium); 2) The light variations among solar-type stars decline as they age. This imposes another timing constraint in that variations in the light output of a star will cause large fluctuations in the climate of one of its planets. Even today, there is an observed correlation between some climate parameters and the very small solar brightness variations that are related to the sunspot cycle; 3) The eccentricity of a star's orbit in the Milky Way must not be too large, otherwise, the influx rate of comets from the Oort cloud will be too large due to the large tidal force variations. The same effect will occur if a star orbits too close to the center of the Milky Way.

Note that these factors have been discussed in the literature as they apply to Earth-like planets. The most often cited non-Earth-like environment is a large moon orbiting a Jupiter-like planet. Such a body can derive long-term heating from its parent star, radioactive decay, or tidal forcing. Most of the factors listed above also apply to this kind of system. However, it is less hospitable to life for three reasons: 1) the strong gravity of the Jovian planet will increase the chance of high-velocity collisions with comets (some of them breaking-up like Shoemaker-Levy 9 did in 1994); 2) the gravitational tidal forcing from the Jovian planet will quickly lead to orbital synchronization of the rotation; and 3) the strong radiation belts of the Jovian planet will subject its moons to high levels of dangerous radiation. Even if life arose in, say, Europa, it is a dead-end street; any life there is locked beneath no less than hundreds of meters of solid ice, and exposure to the surface would kill it instantly. Perhaps now we can begin to understand why the ETI searches have failed. Dr. Sullivan's search of the Milky Way's center was bound to fail, even though he had a huge number of targets; it is a very hostile to life there.

The "Principle of Mediocrity"

In summary, the empirical approach is a powerful argument against more than a handful of (or even zero) ETI existing in the Milky Way over its entire history. It avoids many assumptions inherent in the theoretical approach (theological, origin of life, survivability, etc.). The theoretical approach provides an answer to the conclusion that the empirical argument leads us to. What is not clear is whether any one astrophysical factor dominates over the others. Those factors that are simultaneously positive and negative in their influence on life qualify as dominant factors. For example, the rate of comet impacts must be sufficiently high to supply the Earth with water and other volatiles but not so high so as to lead to a runaway greenhouse (from excessive CO^sub 2^ buildup) and to eliminate the higher life forms too often; this requires a finely tuned system unlikely to be encountered very often. The great distances separating galaxies in the universe probably preclude intergalactic travel, so we cannot make firm statements life in other galaxies from the empirical approach by itself. For this extrapolation we must rely on the astrophysical factors alone.

No Aliens – Earthlike/Life conditions Rare

Earthlike conditions are unique – no aliens – consensus is on our side
The Observer in '00
(Robin McKie, Science Editor, "When it comes to intelligent life, we're as good as it gets", July 16, L/N)

WE ARE alone. Mankind may be the sole intelligent occupier of the entire galaxy, according to a growing number of scientists involved in the Search for Extraterrestrial Intelligence (Seti).
After decades of employing radio telescopes in vain bids to hear E.T. phoning home, and after studying patterns of evolution on Earth, they believe that complex, brainy extraterrestrials must be rare, if not non-existent.
Life may be ubiquitous, they admit, but only on our planet did it evolve into beings capable of rational thought, sophisticated behaviour and powerful civilisations. On other worlds, it has remained rooted at the level of amoebas, microbes, and primitive pond life.
All aliens are scum, in other words an observation with crucial implications. As UK astronomer Ian Crawford points out in the latest issue of Scientific American, we may be 'the most advanced life-forms in the galaxy'.
'We used to think that once life emerged on a planet, intelligent beings would inevitably appear,' added Dr Ian Morison, director of Seti research at Britain's Jodrell Bank radio telescope. 'Now, it seems we only evolved thanks to an extraordinary series of fortuitous events.'
The first and most important of these lucky breaks concerns location, as astronomers Peter Ward and Donald Brownlee recently revealed in Rare Earth: Why Complex Life is Uncommon in the Universe (Copernicus). Earth far from being an average world in an unimportant part of the cosmos turns out to be prime galactic real estate.
First, our sun is a highly stable star and is unaffected by wild fluctuations in output of its radiation. Such afflictions emanate from many other stars and would destroy evolving advanced life-forms, allowing only bacteria-like entities to flourish.
In addition, ours is a safe suburban part of the galaxy, the astronomical equivalent of Cheltenham. By contrast, in more crowded, 'down-town' galactic neighbourhoods, in stellar Sauchiehall Streets of the universe, jostling stars are likely to have continually dislodged the swathes of comets believed to hover at the edges of most solar systems. These comets would then have crashed into each star's family of planets with devastating consequences for their evolving life-forms.
In addition, Earth has a planetary big brother, Jupiter, which sweeps up those few dangerous comets that do make it through to the solar system's inner regions, while our world is further blessed in having a relatively large moon which helped stabilise Earth's rotation, preventing wild swings in our seasons and climate.
All these improbable conditions, in combination, provided the stability that allowed four-billion-year-old primitive slime to evolve about 250,000 years ago into the only intelligent creatures known to science, ourselves. Humanity may therefore be viewed as the outcome of the biggest accumulator bet in the universe. As Professor Brownlee, of Washington University, Seattle, puts it: 'Earth is a charmed place. We know of no other body that is even remotely like it.'

Earthlike conditions are rare – even if they are common – unique circumstances make intelligent life possible that are unlikely to exist elsewhere
Crawford in '00
(Ian, Professor of Astronomy and Physics at University College in London, Scientific American, "Where Are They? Maybe We Are Alone In the Galaxy After All", July, Volume 283, Issue 1, p. 38-43)

To my mind, the history of life on Earth suggests a more convincing explanation. Living things have existed here almost from the beginning, but multicellular animal life did not appear until about 700 million years ago. For more than three billion years, Earth was inhabited solely by single-celled microorganisms. This time lag seems to imply that the evolution of anything more complicated than a single cell is unlikely. Thus, the transition to multicelled animals might occur on only a tiny fraction of the millions of planets that are inhabited by single-celled organisms. It could be argued that the long solitude of the bacteria was simply a necessary precursor to the eventual appearance of animal life on Earth. Perhaps it took this long—and will take a comparable length of time on other inhabited planets—for bacterial photosynthesis to produce the quantities of atmospheric oxygen required by more complex forms of life. But even if multicelled life-forms do eventually arise on all life bearing planets, it still does not follow that these will inevitably lead to intelligent creatures, still less to technological civilizations. As pointed out by Stephen Jay Gould in his book Wonderful Life, the evolution of intelligent life depends on a host of essentially random environmental influences. This contingency is illustrated most clearly by the fate of the dinosaurs. They dominated this planet for 140 million years yet never developed a technological civilization. Without their extinction, the result of a chance event, evolutionary history would have been very different. The evolution of intelligent life on Earth has rested on a large number of chance events, at least some of which had a very low probability. In 1983 physicist Brandon Carter concluded that "civilizations comparable with our own are likely to be exceedingly rare, even if locations as favorable as our own are of common occurrence in the galaxy."

No Aliens – Earthlike/Life Conditions Rare

Conditions for intelligent life are rare – unlikely to form outside the earth
Columbus Dispatch (Ohio) in '00
(David Lore, "LIKELIHOOD OF ALIEN LIFE DWINDLES, RESEARCHERS SAY", January 30, L/N)

During the 1990s, a number of discoveries pointed towards extraterrestrial life. NASA scientists claimed evidence in a meteorite that fell from Mars. Astronomers reported indirect evidence of about 20 planets outside our solar system, based upon slight wobbles in the movement of distant stars. Reconnaissance of the Jovian and Saturnian systems found indications of liquid seas on the moons Europa and Titan.
Two reports this month, however, throw cold water on such easy optimism.
An international group of scientists looking for evidence of planetary systems formed more or less like ours has come up empty-handed. After five years, the PLANET team (Probing Lensing Anomalies NETwork) has yet to spot our first twin.
At the same time, two University of Washington scientists contend that animals and people may well be unique to Earth, given the complex set of conditions necessary for their evolution.
The PLANET report is surprising, given the rash of extrasolar planetary " sightings" in recent years. It was presented during this month's American Astronomical Society meeting in Atlanta by OSU graduate student Scott Gaudi.
Wobble-watchers are seeing evidence of very large planets -- Jupiter-size or bigger -- hugging close to their stars in orbits resembling those of Mercury or Venus.
The PLANET group, however, found nothing when it combed nearby stars for evidence of Jupiter-scale planets in far orbits, the pattern we'd expect from our solar system.
"The fact that we're not detecting any planets bigger than Jupiter (in Jupiterlike orbits) probably indicates that there aren't many Jupiters out there," Gaudi said.
And that's bad news for the search for extraterrestrial intelligence. In the evolution of the solar system, Jupiter likely shielded Earth from bombardment by comets, allowing life to evolve, said OSU astronomer Andrew Gould.
The Washington scientists, astronomer Donald Brownlee and paleontologist Peter Ward, say in Rare Earth that this is indeed the Garden of Eden. "The Earth is a very charmed planet," Ward said. "We know of no other body that is even remotely like Earth."
Primitive life may be widespread in the universe, but the odds of its evolution into higher forms are staggeringly low, they write.
First, the solar system had to be in a protected area of the Milky Way. Then Earth, Jupiter and our moon have to be the right sizes and in the right positions to produce a temperate environment with seasonal changes but no comets.
Only thus could life evolve from slime to scientist over 3 billion or 4 billion years.
"You need to have a vast amount of time to let evolution ramp up to animals, and we think there are only a small number of planets where that could happen," Ward said.

No Aliens – Too Many Conditions For Life

Alien life doesn't exist—too many unlikely events like gene mutations must occur for intelligent life to form

Falconi, writer, physicist and consultant in computing and electro-optics**, 1981** (Oscar, "The Case for Space Colonization—Now!-and why it should be our generation's #1 priority," http://nutri.com/space/)

<Every bit of life on earth, be it plant or animal, bacteria or whale, monosexual or bisexual, is identical in the deepest sense in that they all use nucleic acids for storage and transmission of hereditary information. All organisms use the same basic genetic code. All use proteins in their metabolic processes. The structure of human sperm cells is almost identical with paramecia. It's difficult to escape the conclusion that all life on earth evolved from one single instance of the origin of life.
Now about that single instance - that chance combination of chemicals - it almost certainly happened only once on the earth's surface in all those billions of years. It was clearly a very fortuitous event, possibly never duplicated in all the universe. In labs the world over, many are trying to duplicate it in very ideal conditions. Scientists are injecting into sealed containers all sorts of combinations of amino acids; ammonia; water; gases; heat; sparks; UV, gamma and particle radiation; - whatever they can conjure up. They've come up with interesting organics, some simple proteins, but certainly nothing even closely resembling the most primitive form of monosexual life.
Even when this monosexual life appeared on earth, another giant step had to be taken: bisexual life had to be created. A monosexual species, though it undergoes mutation, can improve its species only at a very slow rate. Mutations must take place serially, whereas with a bisexual species, mutations in different members can both be passed on into the offspring. Thus improvement by mutation and selection can take place in bisexual species at rates many orders of magnitude faster than in monosexual species. In order for advanced forms of life to appear on earth, a bisexual species had to appear. This is no mean task and must be considered another very fortuitous event in man's creation.
One could make a long list of very improbable mutations necessary for an intelligent species: hands that grasp, legs that transport, sight, hearing, speech, etc., plus that one lucky development in the brain that differentiates us from the apes. But for that one mutation we could have been spending the next ten billion years foraging, grooming, and swinging from trees.
Because of the long sequence of beneficial mutations required, intelligent life may not be as ubiquitous throughout the universe as most think. If life is so easily created, and so easily develops, spontaneously, all over the universe, then:
Why isn't there any indication that life on earth developed from anything but ONE very lucky beginning?
Why don't we see untypical lifeforms spontaneously developing in our world that's so overrun with organic matter ?
Why can't man manufacture life even under very artificially conducive conditions? Why do only the familiar carbon-based amino acids and simple proteins ever result from man's attempt to create life in a jar? Apparently these compounds are the ONLY building blocks that could ever result in life anywhere in the universe. That just one path is available for life to evolve is indeed a severe constraint. So instead of the Stanley Miller experiments proving how easy it is to create life, they have in fact added another limitation, another impediment, to the possibility of any other life in the universe, and have added one more argument to back up those of us who feel the probability of our uniqueness is quite good.
Why haven't we ever been contacted, visited, invaded, or colonized by all this other life that's supposed to exist?
Why have all attempts by Americans, Canadians, and Russians to detect radio signals from extraterrestrial beings been fruitless? ("Where are they?" asked Fermi.)Why have our Viking I and Viking II missions completely failed in their search for life on Mars?
Why, out of more than 2,000,000 species of life on earth, has only one (man) succeeded in developing his brain and his culture to such an advanced degree?
The answer to all these questions is that life just isn't all that easy to come by, particularly intelligent life. Too many extremely fortuitous events and conditions all must have taken place, the likes of which may never have been duplicated in all space and all time.
The fact that there is a complete lack of any indication of any other intelligent life has led Trinity University's Dr Michael Hart, using a clever and logical line of reasoning, to conclude that we are unique - at least in our own galaxy. (Quart. Jour. Royal Astr. Soc., 1975)
He has also shown that most classes of stars aren't capable of maintaining a luminosity constant enough, for a period of time long enough, to enable life to develop to an intelligent level. Even our own sun was barely able to qualify. If the earth were just 5% closer to the sun, or 1% farther away, mankind could not have evolved.>

No Aliens – No Evidence (Fermi's Paradox)

At least one alien civilization would travel – their total absence proves they don't exist
Dick in '96
(Steven, Chief Historian for NASA, "The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science", p. 443-444)

The origin of the crisis was renewed attention to a question casually raised by the pioneering nuclear physicist Enrico Fermi almost 10 years before the modern era of SETI. During a luncheon with colleagues at Los Alamos in 1950, Fermi had simply asked, "If there are extraterrestrials, where are they?" a question that now became known as The "Fermi Paradox."93 UFO believers would have answered without hesitation`that the extraterrestrials were here — they had known it all along — and perhaps it was in part the reputation of this group that kept scientists from pursuing the Fermi question for 25 years. That in 1975 the issue was raised in forceful form in two independent articles in the United States and Britain, without at least one of the authors knowing about Fermi's casual question, is some indication of the force of its logic. The fact that there are no intelligent beings from outer space on Earth now, argued Michael Hart and David Viewing in their respective articles, is an observational fact that argues strongly that extraterrestrials do not exist.94 The basis for this conclusion was the assertion that interstellar travel was possible after all, coupled with attention to the time scales involved. The pessimistic views of those like Purcell, Hart claimed, were based on relativistic spaceflight; the use of nuclear propulsion at say, 1/10th the speed of light would have much more reasonable energy requirements.95 Given the age of the universe and the time needed for intelligence to develop, Hart and Viewing stated, extraterrestrials should have populated the galaxy. At a velocity of 1/10th the speed of light, Hart argued, this would have occurred in a mere i million years. Having addressed the physical argument against interstellar flight, Hart went on to argue against sociological and temporal considerations and to reject the view that extraterrestrials were here now. All sociological arguments — that advanced civilizations engage in spiritual contemplation rather than space exploration, that they destroy themselves, or that they set aside planets like the Earth as wildlife preserves — Hart felt were answered because in order to be effective they would have to apply to every race in the galaxy at all times, an unreasonable assumption. If only one race survived, it could have colonized the galaxy given the time scales involved. In Viewing's words, "This, then, is the paradox: all our logic, all our antiisocentrism, assures us that we are not unique — that they must be there. And yet we do not see them."96 Thus, Hart concluded, the existence of thousands of civilizations in the Galaxy is quite implausible: "though it is possible that one or two civilizations have evolved and have destroyed themselves in a nuclear war, it is implausible that every one of 10,000 alien civilizations had done so." And there might be a few advanced civilizations that chose never to travel, but "their number should be small, and could well be zero." The bottom line, if this rationale held, was that "an extensive.search for radio messages from other civilizations is probably a waste of time and money."97

Rocket technology and Von Neumann probes prove any aliens would have reached our solar system – the absence of such evidence mathematically proves we are alone
Dick in '96
(Steven, Chief Historian for NASA, "The Biological Universe: The Twentieth-Century Extraterrestrial Life Debate and the Limits of Science", p. 446-447)

Even as the "Where Are They?" conference participants were gathering in College Park, Maryland, mathematical physicist Frank Tipler was putting the finishing touches on an article that would encapsulate the opposition views to SETI, taking the extreme position that the arguments were so compelling that it was a waste of taxpayers' money to undertake a search. Together with the Maryland conference, Tipler's articulate arguments and controversial extreme stance marked a turnabout in the for-tunes of SETI, a turnabout given wide circulation in the press. Giving due credit to Fermi, Dyson, Hart, and others who had preceded him, Tipler felt that the force of their arguments had not been appreciated, and he delighted in turning the SETI proponents' own arguments against them. Any civilization that had developed the technology for interstellar communication, he argued, must also have developed the technology for interstellar travel. The rudiments of rocket technology, after all, were developed long before the existence of radio waves was expected. More-over, any species capable of interstellar communication would also be adept at computer technology and would have developed "a self-replicating universal constructor with intelligence comparable to the human level," something some experts on Earth expected within a century. Such a machine would have explored or colonized the Galaxy within 300 million years, he argued, at a cost less than that of operating a microwave beacon for several hundred years, as SETI advocates postulated alien civilizations might do.105
In order to make maximum use of the resources of the other stellar systems being explored, Tipler proposed the universal constructor, "a machine capable of making any device, given the construction materials and a construction program," a so-called von Neumann machine, since the mathematician John von Neumann had first discussed it in theoretical terms in 1966. The most important device it would make – out of the raw materials of asteroids and other debris found in the stellar system – would be copies of itself, which would then be launched to the nearest stars, only to repeat the process until the Galaxy was full of such probes. Even with velocities a few 10/1000ths the speed of light (the speed of the Voyager spacecraft leaving the solar system), each interstellar trip would require less than 100,000 years, and the entire Galaxy would be full of probes in 300 million years.
Furthermore, Tipler argued, if one accepts the observational fact that no traces of extraterrestrial intelligence are evident in our planetary system, this places an "astrophysical constraint" on the evolution of intelligent species. If the Galaxy is about 15 billion years old, as is usually stated, then twice as many stars formed before the Sun did. This is approximately equivalent to 100 billion (or 10^11) stars – so that the probability that intelligence will evolve is 1 divided by that number, or 10-11. But since the number of stars born since the Sun was formed is also 10^11, the number of civilizations in the Galaxy is one – ours.'"

No Aliens – No Evidence (Fermi's Paradox)

Advanced civilizations would have the means and motive to colonize – they should be here by now
Gonzalez in '98

(Guillermo, Astronomer at University of Washington , Society, "Extraterrestrials: A modern view", July/August, Volume 35, Issue 5, Proquest)

Basically, there are two ways of approaching the ETI question (as in almost any field of study): empirically and theoretically. The empirical approach is encapsulated most succinctly in Enrico Fermi's famous question, "Where are they?" Newman and Sagan in 1979 attempted to answer Fermi's question by claiming that there has not been sufficient time for a spacefaring civilization to colonize the Milky Way. They based this on a simple model of galactic colonization not unlike those used to describe the colonization of the Pacific islands (except that galactic colonization will be a less random process). In 1981 Frank Tipler of Tulane University pointed out several problems with Newman and Sagan's analysis and claimed that the true colonization time scale is much less than the age of the Milky Way. He quoted a time scale of no more than 300 million years. More recently, Ian Crawford in a 1997 paper in Astronomy and Geophysics quoted values of 5 to 50 million years for the colonization time scale, similar to other recent estimates.
One might object that the resources required for undertaking a galactic scale colonization (or exploration) are astronomically huge! Again, Frank Tipler provided an answer to this objection. He argued very cleverly that a technological civilization, once it develops the ability to send a probe with a Von Neumann machine to a neighboring planetary system, can colonize the Milky Way fairly easily. A Von Neumann machine builds copies of itself using available raw materials and carries out specified tasks. Human beings are natural versions of the Von Neumann machine concept. The first proto-Von Neumann machine may have already been built; the 26 September 1997 issue of Science reported the construction of the first tiny "self-repairing, self-replicating version of a specialized computer." Certainly, the still fledgling field of molecular nanotechnology bears close watching (NASA has already expressed interest). The Mars Pathfinder might also be considered as a tiny (but significant) baby step towards the eventual construction of a Von Neumann machine in that it can perform complex operations without direct and immediate human guidance. The Von Neumann machine approach to colonization does not require very much investment in resources, since almost all of it is spent on the first probe. It need not be very large--just capable of building a Von Neumann machine that can assemble copies of itself and sending them off in interstellar ships. Subsequent probes will draw on the natural resources of the worlds they visit, and each newly explored system becomes the base from which new missions depart. In addition to returning valuable information about other planetary systems, Von Neumann probes can reduce the cost of eventual human colonization by preparing suitable planetary systems for habitation and sending back interstellar ships prepared for manned spaceflight--a sort of interstellar ferry system. The construction of the first interstellar probe (capable of building a Von Neumann machine) will likely be a spin-off of automated mining activities in the Solar System. Given the dangers of working in the space environment and the long-term isolation of workers from Earth (say, in the asteroid belt between Mars and Jupiter), the motivation to automate extraterrestrial mining will be great, very likely resulting in relatively minor development costs for the first Von Neumann machine. Hence, the criticism that an advanced civilization might lack the motivation to colonize other worlds is rendered unlikely, as interstellar travel is a relatively small step after off-world mining is achieved. Notice that a civilization need not maintain a long-term interest in interstellar travel; once the first probe is sent out, exploration and colonization is effectively automatic.

If extraterrestrials existed they should be in the solar system – their absence proves their nonexistence
New Scientist in '96

(Marcus Chown, "Is there anybody out there?", November 23, L/N)

One person who is convinced he has the answer is Frank Tipler of Tulane University in New Orleans. "If the Martian evidence holds up," he says, "we may have to face the fact that primitive life is common in the Universe but that the development of intelligence is vastly improbable." In fact, he believes it is so fantastically improbable that it has happened only once since the big bang. "I believe we are the very first intelligence to arise in our Galaxy," he says.Magazine

This extraordinary claim is based on a straightforward comparison between the age of our Galaxy and how long it would take a civilisation capable of interstellar travel to explore and colonise it. According to Tipler, such a colonisation would be achieved most efficiently by dispatching self-reproducing probes to the stars. The concept of self-reproducing probes was developed back in the 1950s by John von Neumann, a Hungarian-American mathematician. On arrival at a star, the von Neumann probes would use the available resources to build and launch copies of themselves. "One probe would become two, two would become four, and so on," says Tipler. "In this way, they would proliferate exponentially."
Of course, you could argue that if probes like these populated the Galaxy, that would be very different from finding life. However, Tipler makes no distinction between the putative extraterrestrials and their robot emissaries. The probes would need to be highly intelligent and capable of using the material and energy resources in their environment to reproduce. In a sense, they would be life forms in their own right, flesh made machine, and the space-faring successors of planet-based life.
According to Tipler, the biggest obstacle to creating von Neumann probes is computer technology. "The probes would need to have at least human-level intelligence," he says. They would also have to be fast. But travelling at 90 per cent of the speed of light would not be beyond the capabilities of an advanced civilisation, says Tipler.
Travelling at such a speed, a probe would take about five years to reach a star 4.3 light years away - the distance between the Sun and its nearest neighbour, Alpha Centauri. If the probe takes, say, 100 years to make a copy of itself, then the average speed at which all probes would spread throughout the Galaxy would be about 1/25th the speed of light. At such a speed, the exploration of the Galaxy, which is roughly 100 000 light years across, would take about 3 million years. Even travelling at the speed of current rockets, it would take only 300 million years to explore every corner of the Galaxy and maintain a base around each star.
Long overdue
"The time needed to explore the Galaxy is hugely less than the age of the Galaxy, which is around 10 billion years," says Tipler. "So, if extraterrestrials exist, they should be here in the Solar System today. Since they're obviously not, they don't exist."

No Aliens – No Evidence (Fermi's Paradox)

All resolutions to Fermi's paradox are insufficient – if aliens exist we would have evidence – this proves there is no intelligent life out there
Crawford in '00
(Ian, Professor of Astronomy and Physics at University College in London, Scientific American, "Where Are They? Maybe We Are Alone In the Galaxy After All", July, Volume 283, Issue 1, p. 38-43)

There are only four conceivable ways of reconciling the absence of ETs with the widely held view that advanced civilizations are common. Perhaps interstellar spaceflight is infeasible, in which case ETs could never have come here even if they had wanted to. Perhaps ET civilizations are indeed actively exploring the galaxy but have not reached us yet. Perhaps interstellar travel is feasible, but ETs choose not to undertake it. Or perhaps ETs have been, or still are, active in Earth's vicinity but have decided not to interfere with us. If we can eliminate each of these explanations of the Fermi Paradox, we will have to face the possibility that we are the most advanced life-forms in the galaxy. The first explanation clearly fails. No known principle of physics or engineering rules out interstellar spaceflight. Even in these early days of the space age, engineers have envisaged propulsion strategies that might reach 10 to 20 percent of the speed of light, thereby permitting travel to nearby stars in a matter of decades [see "Reaching for the Stars," by Stephanie D. Leifer; Scientific American, February 1999]. For the same reason, the second explanation is problematic as well. Any civilization with advanced rocket technology would be able to colonize the entire galaxy on a cosmically short timescale. For example, consider a civilization that sends colonists to a few of the planetary systems closest to it. After those colonies have established themselves, they send out secondary colonies of their own, and so on. The number of colonies grows exponentially. A colonization wave front will move outward with a speed determined by the speed of the starships and by the time required by each colony to establish itself. New settlements will quickly fill in the volume of space behind this wave front [see illustration on next page]. Assuming a typical colony spacing of 10 light-years, a ship speed of 10 percent that of light, and a period of 400 years between the foundation of a colony and its sending out colonies of its own, the colonization wave front will expand at an average speed of 0.02 light-year a year. As the galaxy is 100,000 light-years across, it takes no more than about five million years to colonize it completely. Though a long time in human terms, this is only 0.05 percent of the age of the galaxy. Compared with the other relevant astronomical and biological timescales, it is essentially instantaneous. The greatest uncertainty is the time required for a colony to establish itself and spawn new settlements. A reasonable upper limit might be 5,000 years, the time it has taken human civilization to develop from the earliest cities to space- flight. In that case, full galactic colonization would take about 50 million years. The implication is clear: the first technological civilization with the ability and the inclination to colonize the galaxy could have done so before any competitors even had a chance to evolve. In principle, this could have happened billions of years ago, when Earth was inhabited solely by microorganisms and was wide open to interference from outside. Yet no physical artifact, no chemical traces, no obvious biological influence indicates that it has ever been intruded upon. Even if Earth was deliberately seeded with life, as some scientists have speculated, it has been left alone since then. It follows that any attempt to resolve the Fermi Paradox must rely on assumptions about the behavior of other civilizations. For example, they might destroy themselves first, they might have no interest in colonizing the galaxy, or they might have strong ethical codes against interfering with primitive life-forms. Many SETI researchers, as well as others who are convinced that ET civilizations must be common, tend to dismiss the implications of the Fermi Paradox by an uncritical appeal to one or more of these sociological considerations. But they face a fundamental problem. These attempted explanations are plausible only if the number of extraterrestrial civilizations is small. If the galaxy has contained millions or billions of technological civilizations, it seems very unlikely that they would all destroy themselves, be content with a sedentary existence, or agree on the same set of ethical rules for the treatment of less developed forms of life. It would take only one technological civilization to embark, for whatever reason, on a program of galactic colonization. Indeed, the only technological civilization we actually know anything about—namely, our own—has yet to self-destruct, shows every sign of being expansionist, and is not especially reticent about interfering with other living things. Despite the vastness of the endeavor, I think we can identify a number of reasons why a program of interstellar colonization is actually quite likely. For one, a species with a propensity to colonize would enjoy evolutionary advantages on its home planet, and it is not difficult to imagine this biological inheritance being carried over into a space-age culture. Moreover, colonization might be undertaken for political, religious or scientific reasons. The last seems especially probable if we consider that the first civilization to evolve would, by definition, be alone in the galaxy. All its SETI searches would prove negative, and it might initiate a program of systematic interstellar exploration to find out why.

ET doesn't exist – if aliens were anywhere in the UNIVERSE they would be here
New Scientist in '96
(Marcus Chown, "Is there anybody out there?", November 23, L/N)

But if the zoo hypothesis and other suggestions to explain why the Solar System has stayed resolutely off the interstellar tourist map are all undermined by the logic of diversity and exponential expansion, what about other, more fundamental reasons for the absence of extraterrestrials?
One possibility, according to Shostak, is that it simply takes too much energy to propel an interstellar probe between the stars at an appreciable fraction of the speed of light. Tipler dismisses this as a weak argument. "I would remind everyone of the prominent American astronomer Simon Newcomb, who in 1904 'proved' that heavier-than-air vehicles would require too much energy to be practical," he says.
Tipler believes that an advanced civilisation would find interstellar travel easy. "In fact, we've already launched interstellar probes - Pioneer 10 and 11," he says. "They've already passed Pluto and could reach the nearest star in about 80 000 years.
This has controversial implications for SETI, which involves looking for intelligent radio or optical broadcasts from nearby stars. "If extraterrestrials sent a radio signal, they would have to trust that there would be someone at the other end with the necessary equipment and patience to listen," says Tipler. "A far more efficient strategy would be to send a spaceship."
Tipler says the same logic would apply if, instead of radio waves, extraterrestrials signalled with gravity waves or neutrinos, a suggestion made by Walter Simmons and his colleagues at the University of Hawaii in 1994 (Quarterly Journal of the Royal Astronomical Society, vol 35, p 321). "Whatever way you look at it, SETI is a waste of time," he says.
Nothing, it appears, can deflect Tipler from his almost messianic conviction that we are alone in the Galaxy. And he goes further. For the irresistible logic of exponential expansion implies that if an intelligent race had arisen anywhere in creation, it would have arrived in the Solar System by now. "Not only are we the first intelligence to evolve in our Galaxy, we are the first intelligence to evolve in the whole Universe," says Tipler. "We are totally alone."

didn't think we had cards on that did you?

No Aliens – A2: Their Evidence Wouldn't Be Noticible

Evidence would be noticeable – the Oort cloud and asteroid belt wouldn't exist if ET did
New Scientist in '96
(Marcus Chown, "Is there anybody out there?", November 23, L/N)

Understandably, other scientists are reluctant to accept that we are alone in the Universe. Some say Tipler is premature in claiming there are no extraterrestrials in our backyard. "It's impossible to tell," says Edward Harrison of the University of Massachusetts at Amherst. "The evidence of life may be written across the sky and we may simply not recognise it."
Many others share Harrison's view that the absence of evidence is not necessarily evidence of absence. "The whole point is we don't know whether they're out there or not," says Freeman Dyson of the Institute for Advanced Studies in Princeton.
Some scientists point out that extraterrestrials could be here without ever letting on. "Say there were nanoprobes abroad in the Solar System," says Seth Shostak of the SETI Institute in Mountain View, California. "How would we ever know?"
However, Tipler claims that if the Solar System had been visited the signs would be unmistakable. "There would be no Oort Cloud of comets and no asteroid belt," he says. "All the available resources would have been turned into structures."
Tipler's idea is that, on arriving at a new star system, a von Neumann probe would not just make copies of itself to send to other stars, but it would also exploit all the available mineral and energy resources of the star system. In our Solar System, for instance, the comets in the Oort Cloud and the asteroids in the asteroid belt would be obvious sources of minerals, which is why Tipler believes they would be long gone if extraterrestrials had ever visited. He has no idea what kind of technological artefacts such resources would be used to create, but that's not unreasonable. After all, the Romans would have had no idea that future civilisations would turn sand into computers, or bauxite into aeroplanes. The disappearance of resources is a logical consequence of Tipler's "biological" model for interstellar colonisation, in which life's success in filling all available niches and exploiting all available resources on Earth is repeated by intelligent life in the greater arena of the Universe.

No Aliens – A2: You Anthropomorphize

Evolution would be universal – don't need to assume ET is like humans
New Scientist in '96
(Marcus Chown, "Is there anybody out there?", November 23, L/N)

Others, like Harrison, believe there is a fundamental error in Tipler's biological model of the expansion of intelligent life. "It assumes that extraterrestrials share the motivations of humans," he says. "However, life may evolve to a level beyond imagination and its motivations may be utterly incomprehensible to us."
Tipler counters that he assumes only that intelligent life forms behave like all known life forms on Earth, all of which go through a dispersal phase. He says it is time astronomers admitted that intelligent life is subject to the same evolutionary laws as other life.

No Aliens – A2: We're A Zoo

We're not a zoo
Gonzalez in '98
(Guillermo, Astronomer at University of Washington , Society, "Extraterrestrials: A modern view", July/August, Volume 35, Issue 5, Proquest)

Another proposed solution to Fermi's paradox is the idea that the Earth is being isolated as a kind of "zoo." Michael Hart, and more recently, Ian Crawford, have pointed out a number of very serious problems with this line of reasoning. For example, for most of its history the Earth has been inhabited by simple lifeforms, and thus there should have been little incentive to isolate it until relatively recently. Even if a civilization wanted to keep the Earth isolated, it would have to do so for billions of years, keeping other civilizations away. This does not seem at all likely. Very recent visitation is also unlikely on temporal grounds: why after billions of years would two advanced civilizations (ours and one other) arise nearly simultaneously in the Milky Way?

Zoo hypothesis is ridiculous
New Scientist in '96
(Marcus Chown, "Is there anybody out there?", November 23, L/N)

Yet another possible explanation for the absence of extraterrestrials is the "zoo hypothesis". According to this hypothesis, emerging civilisations such as ours are cordoned off by star-faring civilisations of the Galaxy as part of a Star Trek-like non-interference policy. But, according to Tipler, this idea also has its Achilles heel. "It's a universal truth in human society that if you have three members of a society, you will have four opinions," he says. "There will inevitably be a diversity of opinion among Galactic societies about whether we should be contacted or not."
Tipler also believes it would be impossible to enforce such a non-interference policy. "It would be necessary to patrol the perimeter of the Solar System," he says. "Even light beams would have to be stopped from entering."
It is hard to imagine the existence of a coherent Galaxy-wide society when it takes 100 000 years for a communications signal to cross from one side to the other. But if the extraterrestrials could communicate faster than the speed of light, then perhaps the society could enforce a non-interference policy, as pointed out last year by Ian Crawford of University College London. (Quarterly Journal of the Royal Astronomical Society, vol 36, p 205). However, there remains the serious problem of maintaining an unwavering policy over millions or maybe hundreds of millions of years, when the lesson from Earth is that no society stays unchanged forever.

No Aliens – A2: They Hang Out In Interesting Parts Of The Galaxy

Even if aliens chill in cool places their evidence would be here
New Scientist in '96
(Marcus Chown, "Is there anybody out there?", November 23, L/N)

Assuming that Tipler's argument is valid, those who oppose his contention that we are alone must explain how the Galaxy can be teeming with colonising civilisations without any ending up in our neck of the woods. One possibility, according to Shostak, is that the Solar System is too dull. "Humans, despite colonising the Earth, are not everywhere on the planet - they are concentrated in cities," says Shostak. "In the same way, extraterrestrials may be concentrated in the interesting places in the Milky Way - the Galactic centre, giant molecular clouds, giant star clusters, and so on." Even if humans are not everywhere on Earth, says Tipler, the effects of their activities are seen everywhere on Earth, and microorganisms are ubiquitous.

No Aliens – A2: They Kill Themselves

Even if most civilizations go Kurt Cobain style a few should have survived to visit earth
New Scientist in '96
(Marcus Chown, "Is there anybody out there?", November 23, L/N)

Other possible explanations for the absence of extraterrestrials in our neighbourhood include the "self-destruction hypothesis" and the "contemplation hypothesis". According to the self-destruction hypothesis, civilisations blow themselves up or otherwise commit suicide before they can travel to other stars. The contemplation hypothesis states that mature civilisations grow out of the adolescent urge to colonise, preferring instead to stay at home and explore the frontiers of art, perhaps, or contemplate the meaning of life. However, all these possibilities suffer from the same flaw. "Technological civilisations are likely to be diverse just like living organisms," says Tipler. "So, even if most self-destruct or stay at home to gaze at their navels, there will always be the exceptions. And the exceptions, by the logic of Darwinian evolution, are bound to come our way."
In the long term, says Tipler, even extraterrestrials with a tendency to be couch potatoes will have to up sticks and move on. "Just as the Sun will turn into a red giant and force us to leave the Earth, the stars of alien races will eventually force them to go forth and colonise," he says.

Space Good Frontline

Space solves multiple existential threats – the program is key to survival
Pelton in '03
(Joseph, Director of the Space and Advanced Communications Research institute at George Washington University and Executive Director of the Arthur C. Clarke Foundation, "COMMENTARY: Why Space? The Top 10 Reasons", September 23, http://www.space.com/news/commentary_top10_030912.html)

Actually the lack of a space program could get us all killed. I dont mean you or me or my wife or children. I mean that Homo sapiens as a species are actually endangered. Surprising to some, a well conceived space program may well be our only hope for long-term survival. The right or wrong decisions about space research and exploration may be key to the futures of our grandchildren or great-grandchildren or those that follow.

Arthur C. Clarke, the author and screenplay writer for 2001: A Space Odyssey, put the issue rather starkly some years back when he said: The dinosaurs are not around today because they did not have a space program. He was, of course, referring to the fact that we now know a quite largish meteor crashed into the earth, released poisonous Iridium chemicals into our atmosphere and created a killer cloud above the Earth that blocked out the sun for a prolonged period of time.
This could have been foreseen and averted with a sufficiently advanced space program. But this is only one example of how space programs, such as NASAs Spaceguard program, help protect our fragile planet. Without a space program we would not know about the large ozone hole in our atmosphere, the hazards of solar radiation, the path of killer hurricanes or many other environmental dangers. But this is only a fraction of the ways that space programs are crucial to our future.
He Continues…

Protection against catastrophic planetary accidents: It is easy to assume that an erratic meteor or comet will not bring destruction to the Earth because the probabilities are low. The truth is we are bombarded from space daily. The dangers are greatest not from a cataclysmic collision, but from not knowing enough about solar storms, cosmic radiation and the ozone layer. An enhanced Spaceguard Program is actually a prudent course that could save our species in time.

Every delay in space colonization results in wasted energy – the cost is a hundred trillion lives per second
Bostrum, Department of Philosophy, Yale University, Director of the Future of Humanity Institute at Oxford University**, 2002** (Nick, "Astronomical Waste: The Opportunity Cost of Delayed Technological Development," Preprint, Utilitas Vol. 15, No. 3, pp. 308-314, http://www.nickbostrom.com/astronomical/waste.html)

As I write these words, suns are illuminating and heating empty rooms, unused energy is being flushed down black holes, and our great common endowment of negentropy is being irreversibly degraded into entropy on a cosmic scale. These are resources that an advanced civilization could have used to create value-structures, such as sentient beings living worthwhile lives.

The rate of this loss boggles the mind. One recent paper speculates, using loose theoretical considerations based on the rate of increase of entropy, that the loss of potential human lives in our own galactic supercluster is at least ~10^46 per century of delayed colonization.[1] This estimate assumes that all the lost entropy could have been used for productive purposes, although no currently known technological mechanisms are even remotely capable of doing that. Since the estimate is meant to be a lower bound, this radically unconservative assumption is undesirable.

We can, however, get a lower bound more straightforwardly by simply counting the number or stars in our galactic supercluster and multiplying this number with the amount of computing power that the resources of each star could be used to generate using technologies for whose feasibility a strong case has already been made. We can then divide this total with the estimated amount of computing power needed to simulate one human life.

As a rough approximation, let us say the Virgo Supercluster contains 10^13 stars. One estimate of the computing power extractable from a star and with an associated planet-sized computational structure, using advanced molecular nanotechnology[2], is 10^42 operations per second.[3] A typical estimate of the human brain's processing power is roughly 10^17 operations per second or less.[4] Not much more seems to be needed to simulate the relevant parts of the environment in sufficient detail to enable the simulated minds to have experiences indistinguishable from typical current human experiences.[5] Given these estimates, it follows that the potential for approximately 10^38 human lives is lost every century that colonization of our local supercluster is delayed; or equivalently, about 10^31 potential human lives per second. While this estimate is conservative in that it assumes only computational mechanisms whose implementation has been at least outlined in the literature, it is useful to have an even more conservative estimate that does not assume a non-biological instantiation of the potential persons. Suppose that about 10^10 biological humans could be sustained around an average star. Then the Virgo Supercluster could contain 10^23 biological humans. This corresponds to a loss of potential equal to about 10^14 potential human lives per second of delayed colonization. What matters for present purposes is not the exact numbers but the fact that they are huge. Even with the most conservative estimate, assuming a biological implementation of all persons, the potential for one hundred trillion potential human beings is lost for every second of postponement of colonization of our supercluster.[6]

Space Good Frontline

Space colonization will check government tyranny and ensure the survival of civilization by checking corrupt governmental power
Ust, author and writer for The Thought, **2004** (Daniel, "Freedom Above or Tyranny Below," http://mars.superlink.net/~neptune/SpaceFreedom.html)

The Future on Earth Some might look at this from the angle of the potential for freedom in space alone. This is, after all, my main point – that freedom will be greater in space. However, the other side of this is that freedom on Earth is very limited. The more transportation and monitoring technology progresses on Earth, the more limited freedom will be barring no outlet into space or no other checks on centralized power. Over time, even cultural and constitutional checks erode. Absent any external shocks to the world-system on Earth or off world expansion, there seem to be only two paths that will be taken. Either the level of freedom will rise and fall as governments rise and fall or it will reach a steady state. In either case, the total amount of freedom is likely to be a lot less than even now – and now is hardly ideal. This is because there are no checks on governmental power save for the stark ones that governmental power must not be abused to the point that people either openly rebel or to the point where society generally declines. (Even rebellion or a general decline and collapse only amount to a temporary period of decentralization of the worst sort before centralization gets back on track.) 3
Settling space solves this problem because it will not only allow people to move away from power centers, but will also provide an external shock to the system. This shock will likely not topple existing governments, but it will act to check their power. Why? Those governments that are less exploitative, less controlling will likely have better economies, more immigrants, more talented people and this translates into stability and stronger militaries. Absent an external shock of this sort, the disaffected have nowhere to turn to and there's no competition.
The space frontier, too, unlike any terrestrial one is inexhaustible. It will be the ultimate edge society, since the edge is highly mobile and practically infinite. Once settlements are established in Earth orbit, people will eventually migrate beyond there out into the solar system, then out into the galaxy and beyond. There is no physical limit to movement, save the need for energy and time.
Looked at this way, the option to settle space is not some pie in the sky dream, but likely the best option for the future of humanity and the future of civilization. In other words, those interested in freedom in the long-range, in the survival of humanity, and in the survival of civilization should think seriously about space migration and settlement.

Reject every infringement on liberty
Petro – Professor of Law at Wake Forest University – **1974** (Sylvester, University of Toledo Law Review, Spring, p.480)

However, one may still insist, echoing Ernest Hemingway – "I believe in only one thing: liberty." And it is always well to bear in mind David Hume's observation: "It is seldom that liberty of any kind is lost all at once." Thus, it is unacceptable to say that the invasion of one aspect of freedom is of no import because there have been invasions of so many other aspects. That road leads to chaos, tyranny, despotism, and the end of all human aspiration. Ask Solzhenitsyn. Ask Milovan Djilas. In sum, if one believes in freedom as a supreme value and the proper ordering principle for any society aiming to maximize spiritual and material welfare, then **every invasion of freedom** must be emphatically identified and resisted with undying spirit.

Space exploration is key to a cure for AIDS
Dihn no date given
(Dung V., Xavier University Jounral, "Is Space Exploration Worth It?" http://www.xula.edu/xulanexus/issue3/Dihn.html)

Unlike other government agencies, NASA space exploration does not yield a short-termed economic gain, but it is a long-term investment into the future of the United States and the world. Its benefits cannot be seen in a short period of a few years, nor can it provide tangible economic gains. Although the cost of its operation is very expensive, its rewards for the future are so valuable that no monetary value can serve as its equal. Space exploration could lead in the future to the discovery of new planets or solar systems where new elements are discovered or microorganisms that can cure AIDS or other incurable diseases. (Piellusch) Space exploration may allow humans to live on other planets when the planet Earth is no longer a suitable place to live due to human's overuse and abuse. (Piellusch) The technology of space exploration, such as the weather satellites and observing systems, also allows a better understanding of the global climate change and the changing levels of the ocean (Space Shuttle Columbia: Science and Government) Not only does it provide new products, space exploration also provides new jobs. (Burton) In a recent interview, Dr. John H. Gibbons, a former science and technology adviser to President Clinton, stated, "If we think about the Hubble, which has opened our eyes in a way that absolutely overwhelms everything we'd done before. I think that's a very noble and worthy investment." (Space Shuttle Columbia: Science and Government) Daniel F. Burton, president of the Council on Competitiveness, said "Its importance to the economy far outweighs what the data of simple market size would suggest ... It has a huge role not only in creating and forcing the application of technology, but also in creating, markets." (Burton) The American public must look beyond the rim of the present and widen their perspective to the future of tomorrow. Investment in space exploration is the best investment to the future success of the United States. Without the continuous updates of knowledge from space exploration, the United States, whose economic is increasingly dependent on knowledge, would fall behind the other developed countries.

Space Good Frontline

The impact is extinction
Muchiri in '00
(Michael, Ministry of Education in Kenya, THE JAKARTA POST, "Will Annan finally put out Africa's fires?", March 6, L/N)

There is no doubt that AIDS is the most serious threat to humankind, more serious than hurricanes, earthquakes, economic crises, capital crashes or floods. It has no cure yet. We are watching a whole continent degenerate into ghostly skeletons that finally succumb to a most excruciating, dehumanizing death. Gore said that his new initiative, if approved by the U.S. Congress, would bring U.S. contributions to fighting AIDS and other infectious diseases to $ 325 million.
Does this mean that the UN Security Council and the U.S. in particular have at last decided to remember Africa? Suddenly, AIDS was seen as threat to world peace, and Gore would ask the congress to set up millions of dollars on this case. The hope is that Gore does not intend to make political capital out of this by painting the usually disagreeable Republican-controlled Congress as the bad guy and hope the buck stops on the whole of current and future U.S. governments' conscience.
Maybe there is nothing left to salvage in Africa after all and this talk is about the African-American vote in November's U.S. presidential vote.
Although the UN and the Security Council cannot solve all African problems, the AIDS challenge is a fundamental one in that it threatens to wipe out man. The challenge is not one of a single continent alone because Africa cannot be quarantined.
The trouble is that AIDS has no cure -- and thus even the West has stakes in the AIDS challenge. Once sub-Saharan Africa is wiped out, it shall not be long before another continent is on the brink of extinction. Sure as death, Africa's time has run out, signaling the beginning of the end of the black race and maybe the human race.

INDEPENDENTLY SPACE-DESIGNED TECHNOLOGY SOLVES A CBW ATTACK
HUANG, WRITER FOR SPACEFLIGHT OR EXTINCTION **2004** [SAGAN'S RATIONALE FOR HUMAN SPACEFLIGHT, http://www.thespacereview.com/article/261/1

Space technology, despite its name, is not limited to space. Technology designed for the extremes of space can be used in any extreme environment. If a catastrophe made Earth hazardous for life, space technology will sustain life in space and on Earth. This is happening now. NASA aims to use spacesuit technologies in a suit for homeland security: a protective suit for environments contaminated with biological or chemical agents.

Bio-terrorism causes extinction
John **Steinbruner,** senior fellow at the Brookings Institution, chair of the committee on international security and arms control of the National Academy of Sciences, Foreign Policy, December 22, **1997**
That deceptively simple observation has immense implications. The use of a manufactured weapon is a singular event. Most of the damage occurs immediately. The aftereffects, whatever they may be, decay rapidly over time and distance in a reasonably predictable manner. Even before a nuclear warhead is detonated, for instance, it is possible to estimate the extent of the subsequent damage and the likely level of radioactive fallout. Such predictability is an essential component for tactical military planning. The use of a pathogen, by contrast, is an extended process whose scope and timing cannot be precisely controlled. For most potential biological agents, the predominant drawback is that they would not act swiftly or decisively enough to be an effective weapon. But for a few pathogens - ones most likely to have a decisive effect and therefore the ones most likely to be contemplated for deliberately hostile use - the risk runs in the other direction. A lethal pathogen that could efficiently spread from one victim to another would be capable of initiating an intensifying cascade of disease that might ultimately threaten the entire world population. The 1918 influenza epidemic demonstrated the potential for a global contagion of this sort but not necessarily its outer limit.

Space production is key to environmental protection – solves pollution and provides energy
Asimov, author, former president of the American Humanist Association, and biochemist**,** 2003 (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)
Another kind of structure in outer space is factories. There is no reason why a good proportion of our industrial factories couldn't be placed into orbit. Space has very unusual properties that may be helpful to us. It has unlimited vacuum, zero gravity, the possibility of high and low temperatures, and hard radiation. There are a great many things we can do in space that we can do only with difficulty, if at all, on Earth. Most important of all, when we have a factory in space, any unavoidable pollution that it produces can be discharged into space.
Space is huge compared to the surface of the Earth. Some people argue that to earlier generations the ocean seemed huge and capable of absorbing any amount of pollution. But now we are in danger of poisoning the entire atmosphere. Some people argue that in the future we may be so casual about releasing pollutants into space that we may gradually poison all the space around ourselves. However, that won't happen, for not only is space literally millions of times more voluminous than the biosphere and not occupied by trillions of living things, but it is also true that nothing we release into space is going to stay there because of something called the solar wind. The Sun emits speeding particles in every direction; it has been doing this as long as it has been in existence and will continue to do this for billions of years. This solar wind will push the pollutants out beyond the orbit of Mars, beyond the asteroids and into the outer solar system, where there is a trillion times more room than in the Earth's neighborhood. The solar wind has a natural ventilating effect. This is important because it means that perhaps Earth can get rid of its dark satanic mills (to quote William Blake, who wrote in the first decades of the 19th century) without abandoning industrialization. People who view industrialization as a source of the Earth's troubles, its pollution, and the desecration of its surface, can only advocate that we give it up. This is something that we can't do; we have the tiger by the tail. We have 4.5 billion people on Earth. We can't support that many unless we're industrialized and technologically advanced. So, the idea is not to get rid of industrialization but to move it somewhere else. If we can move it a few

thousand miles into space, we still have it, but not on Earth. Earth can then become a world of parks, farms, and wilderness without giving up the benefits of industrialization.

Space Good Frontline

Expansion into space would prevent global wars resulting in extinction
Asimov, author, former president of the American Humanist Association, and biochemist, **2003** (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)

I have a feeling that if we really expanded into space with all our might and made it a global project, this would be the equivalent of the winning of the West. It's not just a matter of idealism or preaching brotherhood. If we can build power stations in space that will supply all the energy the world needs, then the rest of the world will want that energy too. The only way that each country will be able to get that energy will be to make sure these stations are maintained. It won't be easy to build and maintain them; it will be quite expensive and time-consuming. But if the whole world wants energy and if the price is world cooperation, then I think people are going to do it.
We already cooperate on things that the whole world needs. International organizations monitor the world's weather and pollution and deal with things like the oceans and with Antarctica. Perhaps if we see that it is to our advantage to cooperate, then only the real maniacs will avoid cooperating and they will be left out in the cold when the undoubted benefits come in. I think that, although we as nations will retain our suspicions and mutual hatreds, we will find it to our advantage to cooperate in developing space. In doing so, we will be able to adopt a globalist view of our situation. The internal strife between Earthlings, the little quarrels over this or that patch of the Earth, and the magnified memories of past injustices will diminish before the much greater task of developing a new, much larger world. I think that the development of space is the great positive project that will force cooperation, a new outlook that may bring peace to the Earth, and a kind of federalized world government. In such a government, each region will be concerned with those matters that concern itself alone, but the entire world would act as a unit on matters that affect the entire world. Only in such a way will we be able to survive and to avoid the kind of wars that will either gradually destroy our civilization or develop into a war that will suddenly destroy it. There are so many benefits to be derived from space exploration and exploitation; why not take what seems to me the only chance of escaping what is otherwise the sure destruction of all that humanity has struggled to achieve for 50,000 years? That is one of the reasons, by the way, that I have come from New York to Hampton despite the fact that I have a hatred of traveling and I faced 8 hours on the train with a great deal of fear and trembling. It was not only The College of William and Mary that invited me, but NASA as well, and it is difficult for me to resist NASA, knowing full well that it symbolizes what I believe in too.

Space colonization makes immortality possible—the infinity of time and space are inherently related
Jackson, Professor of Science Fiction at Goucher College, **1998** (Todd, "Immortality," http://www.sfsite.com/10a/imm42.htm)

Bova also considers the social impact of such technology. He moves briskly through several topics: the effect of immortality on marriage, the effect on the environment, and on retirement and global economics generally. He often raises potential problems and then offers creative solutions (I especially like his solution to the problem immortality would present to our notions of retirement) but this book is finally more valuable for raising issues than offering detailed solutions. As in his presentation of the research that should lead to human immortality, Bova inspires a sense of comprehensiveness -- the sense that he's covered all the bases. Perhaps the only obvious topic I found missing was that of space colonization. Although Bova offers a fairly extensive discussion of the impact of human immortality upon population growth, it seems likely that immortality and space colonization would necessarily intertwine. Time and space, together again: an infinity of the former requires an infinity of the latter. Bova's discussion of reduced fertility among life-extended lab specimens is interesting as far as it goes, but it still suggests a spatial framework in which this planet is, for all practical purposes, the entire human universe. It seems more likely that immortality would be the thing that finally makes space colonization not just wonderful but necessary. Perhaps Bova, already writing on such an esoteric subject, simply chose to fight one "giggle factor" at a time.

Extensions: Space Key To Survival (Multiple Threats)

Space colonization is needed to preserve the human species from deadly threats of volcanoes, asteroid collisions, and solar failures

Young, former astronaut and associate technical director of NASA Johnson Space Center, **2003** (John W., "The BIG Picture: Ways to Mitigate or Prevent Very Bad Planet Earth Events," http://space.balettie.com/Young.html)

Conclusion: The human race is at total war. Our enemy is ignorance, pure and simple. The last 25 years of NASA's Solar System exploration including Earth is telling us what we need to do to preserve our species. This new knowledge is useless unless we act on it. Large volcanoes on Earth, giant impacts on Earth, or unreliable solar activity cannot be ignored. Historical statistics show that these events are likely in our lifetimes or the lifetimes of our children and grandchildren. Knowing what we know now, we are being irresponsible in our failure to make the scientific and technical progress we will need for protecting our newly discovered severely threatened and probably endangered species -- us. NASA is not about the 'Adventure of Human Space Exploration,' we are in the deadly serious business of saving the species. All Human Exploration's bottom line is about preserving our species over the long haul.

Space colonization will prevent human extinction from the death of the sun or nuclear and biological warfare

Engdahl, award-winning science fiction writer, **1994** (Sylvia, "Space and Human Survival, Part I," http://www.sylviaengdahl.com/space/survival.htm)

Until recently, the reason most commonly offered for believing our survival depends on space travel was that our species will need to move elsewhere in order to survive the ultimate death of our sun, or the possibility of our sun turning into a nova. (Scientists now believe that these specific scenarios won't happen; but the sun will eventually become a red giant, which as far as Earth is concerned, is an equally disastrous one.) This is not of such remote concern as it may seem, as I'll explain below. However, it surely is a remote event, billions of years in the future, and I don't blame anyone for not giving it very high priority at present. It is far from being my main reason.
A more urgent cause for concern is the need not to "put all our eggs in one basket," in case the worst happens and we blow up our own planet, or make it uninhabitable by means of nuclear disaster or perhaps biological warfare. We would all like to believe this won't happen, yet some people are seriously afraid that it will—it's hardly an irrational fear. Peace with Russia may have drawn attention from it, yet there are other potential troublemakers, even terrorists; the nuclear peril is not mere history. Furthermore, there is the small but all-too-real possibility that Earth might be struck by an asteroid. We all hope and believe our homes won't burn down, and yet we buy fire insurance. Does not our species as a whole need an insurance policy? Even Carl Sagan, a long-time opponent of using manned spacecraft where robots can serve, came out in support of space colonization near the end of his life, for this reason; see his book Pale Blue Dot. And in an interview with Britain's newspaper Daily Telegraph, eminent cosmologist Stephen Hawking said, "I don't think that the human race will survive the next thousand years unless we spread into space. There are too many accidents that can befall life on a single planet." Hawking is more worried about the possibility of our creating a virus that destroys us than about nuclear disaster. However, he said, "I'm an optimist. We will reach out to the stars."

Space colonization is key to human survival – solves asteroids and super-volcanoes

The Houston Chronicle 2002 (Mark Carreau, "Space Study Seen As Key to Survival," October 19, http://abob.libs.uga.edu/bobk/ccc/cc102202.html)

With Apollo astronaut John Young leading the charge, top aerospace experts warned Friday that humanity's survival may depend on how boldly the world's space agencies venture into the final frontier. Only a spacefaring culture with the skills to travel among and settle planets can be assured of escaping a collision between Earth and a large asteroid or devastation from the eruption of a super volcano, they told the World Space Congress. "Space exploration is the key to the future of the human race," said Young, who strolled on the moon more than 30 years ago and now serves as the associate director of NASA's Johnson Space Center. "We should be running scared to go out into the solar system. We should be running fast."
Scientists believe that an asteroid wiped out the dinosaurs more than 60 million years ago, and are gathering evidence of previously large collisions. "The civilization of Earth does not have quite as much protection as we would like to believe," said Leonid Gorshkov, an exploration strategist with RSC Energia, one of Russia's largest aerospace companies. "We should not place all of our eggs in one basket."

Space colonization prevents human extinction from global warming, nuclear war, or viruses

Associated Press 2006 (Sylvia Hui, "Hawking Says Humans Must Go Into Space," http://apnews.myway.com/article/20060613/D8I7ADB81.html)

HONG KONG (AP) - The survival of the human race depends on its ability to find new homes elsewhere in the universe because there's an increasing risk that a disaster will destroy the Earth, world-renowned scientist Stephen Hawking said Tuesday.
The British astrophysicist told a news conference in Hong Kong that humans could have a permanent base on the moon in 20 years and a colony on Mars in the next 40 years."We won't find anywhere as nice as Earth unless we go to another star system," added Hawking, who arrived to a rock star's welcome Monday. Tickets for his lecture planned for Wednesday were sold out.
He added that if humans can avoid killing themselves in the next 100 years, they should have space settlements that can continue without support from Earth. "It is important for the human race to spread out into space for the survival of the species," Hawking said.

"Life on Earth is at the ever-increasing risk of being wiped out by a disaster, such as sudden global warming, nuclear war, a genetically engineered virus or other dangers we have not yet thought of."	222

Extensions: Space Key To Survival (Multiple Threats)

HumanExtinction inevitable in the status-quo – we have less than 1% chance of surviving in the next century absent space colonization
Falconi, writer, physicist and consultant in computing and electro-optics, **1981** (Oscar, “The Case for Space Colonization—Now!-and why it should be our generation’s #1 priority,” http://nutri.com/space/)

Unfortunately, mankind reproduces itself in series. One generation begets the next. When one generation ceases to exist all future generations are lost. In the past, the human race was well dispersed, with little possibility for self-destruction. There was no reason to think that the existent generation might be the last. But times have changed. With weaponry and research advancing furiously, it could well be that our chance for self-destruction is doubling every year or two. Carl Sagan, in a recent episode of his very fine TV series, "Cosmos", has reasoned that the chance of human life continuing to exist on earth is less than 1% per century. This is equivalent to less than a 50-50 chance of lasting the next 15 years! As it stands now, it appears that most Americans (half are less than 30) will die a violent death. When the odds against us are bad, and rapidly getting worse, it's time to search for a solution.
But it's impossible to solve the problem of preventing, with 100% certainty, our self-destruction here on earth. This problem is just too complicated, and asks too much of man - such as restraint, understanding, objectivity, intelligence, compromise, and common sense - characteristics which are necessary for future survival, but seldom met with in practice, particularly in politics. We are now left in the ludicrous position of hoping we'll survive through each year. But the hope that no unforeseen catastrophe will destroy man is a flimsy basis on which to assume that our species will enjoy its maximum possible time in this universe. If you want insurance, you've got to pay the premium. And the premium is due now. The only known life in the universe exists on earth, and, for a surprisingly large number of reasons, could soon find itself destroyed. Man is particularly susceptible to such a tragedy compared to the crustaceans, amphibians, insects, and the countless other hardy families. Only his superior brain has enabled him to successfully compete despite a relatively fragile constitution. Should we succeed in our self-destruction, it's doubtful that nature could once again turn the trick of creating another highly advanced being out of any primitive life remaining on earth.
By whatever philosophical standards one bases his thinking, one must conclude that life is better than no life at all. Man's first thought must be to preserve the human race at all costs. It must not be allowed to come to an end, and specifically, it mustn't be allowed to destroy itself. In the far distant future, it appears that man will be doomed by the lack of available energy (the 2nd law). This may not come about for 100's of billions of years. Before that, a collapsing universe may put an end to all life. And before that, our sun will become a red giant, probably ending all life in our solar system. But even that won't come about for several billions of years. Whether these problems can be solved isn't known, but man has plenty of time to think about them.

Backup space civilizations are needed to prevent human extinction from fatal vaccines
Falconi, writer, physicist and consultant in computing and electro-optics, **1981** (Oscar, “The Case for Space Colonization—Now!-and why it should be our generation’s #1 priority,” http://nutri.com/space/)

Another illustration, closer to home, of how disaster might strike an intelligent and well-meaning civilization: much has been made of how vaccines could permanently eliminate German measles, polio, mumps, and many other maladies. By merely vaccinating all our babies and children, the United States might be entirely free of these problems and several hundred young lives would be saved per year. Aside from the economics and wisdom of each year subjecting millions of children to many millions of injections, with consequent errors, side effects, and deaths, just to save several hundred of the more frail children, we must consider the possibility of inflicting the whole American and world population with massive, permanent, genetic damage. Remember that German measles is notorious for causing defective offspring. Likewise, the Salk polio vaccine has been suspected of causing chromosome damage. And mumps often troubles the reproductive organs of both sexes. It's quite clear that any promising new vaccines should be tried on only a very limited number of humans, and for at least several generations, before subjecting our entire population to a genetically unproven vaccine. Measles, for instance, is peculiar to humans and therefore a measles vaccine cannot be exonerated by animal tests. Incidentally, thalidomide was animal tested - and passed! Today, vaccines can be used in the prevention of 18 diseases. The vaccines used to prevent measles, mumps, and rubella (German measles) have been developed only in the past several years, and the polio vaccine just a few years earlier.
And yet the U.S. Public Health Department recommends that ALL children have their polio and rubella shots when they're just one year old. The mumps shot is recommended for children approaching puberty! Already over 80% of all Americans between 1 and 20 have had 3 or more polio shots. God help us if we've overlooked some effect. We should be finding out in a few years - BUT only if the effect is dominant. It should be noted that thalidomide was caught quickly only because of its effect on the 1st generation. The mutation was dominant and HAD to appear in the 1st generation. If the mutation was recessive, the effects could not have been detected until the 2nd generation, by which time a tragic, and possibly fatal, blow may have been inflicted to our gene-pool. If we continue to indiscriminately subject the whole population to every promising advance, be it vaccine, food additive, drug, etc., then the chances are not negligible that in some decade in the near future the U.S. or world population will be decimated or destroyed. "Many voice the view that the Salk vaccine has been directly responsible for the major increase of leukemia in this country. The 'theory' that this vaccine had any value should be put to rest." Dr Frederick R Klenner (1974) Acclaimed pioneer in medical research: After all, this is only the 20th century. In our supreme ignorance compared to the 21st, or the 31st century, we recklessly choose to play with fire. Hundreds of young lives a year, for instance, lost to polio, rubella, or whatever, isn't a high price to pay for protecting trillions of unborn Americans. A few generations of human testing for each new advance is probably all that's required to prevent a catastrophe.
But since it doesn't appear that the government, or the medical profession, or the drug industry, will ever be convinced of the above arguments, humanity's only protection is a space colony. There's an urgent need for an isolated backup civilization.

Extensions: Space Key To Survival (Multiple Threats)

Space colonization will prevent planetary extinction—habitable space checks a super nova
Davidson, President of the Houston Space Society and member of the Atlantis Project," **1995** (Jim, "Freedom Needs Frontiers," January 1995, http://www.islandone.org/Policy/TheFutureWeWant.html)

Since I was six, watching the Apollo 11 landing from Taiwan with my family, I've been interested in space. For all that time, I knew that opening the space frontier was vital. It would save the world. I learned later that we could get our resources from lifeless planets and planetoids instead of from the only one capable of supporting life. We could create new materials in weightlessness, use vacuum for exciting industrial processes, see the world from a new vantage point, create hotels and tourist facilities, bring solar power down from a place where there was no night and no clouds. Most of all, we would not be threatened with extinction just because some disaster made Earth unlivable. Eventually, we would spread to the stars and even a disaster like our sun going nova would not wipe out the human race.

Humans must colonize space to prevent numerous scenarios for extinction—These include nuclear war, lead poisoning, and particle accelerator chain reactions that cause mass death
Falconi, writer, physicist and consultant in computing and electro-optics, **1981** (Oscar, "The Case for Space Colonization—Now!-and why it should be our generation's #1 priority," http://nutri.com/space/)

And just how many extremely subtle, innocent, activities are unknowingly and unpredictably leading us to a tragic premature end? We of course can never hope to predict, or even detect, every eventuality in time. A backup colony in near space appears to be the only solution.". . . I'm glad I'm not a young man and I'm sorry for my grandchildren." David E Lilienthal - Jan 1976 First Chairman of the U.S. Atomic Energy Commission ** Worldwide lead pollution over the centuries is indicated by the concentration of lead in different levels of polar ice. Since industrialization began, about 200 years ago, the lead content of polar ice has increased by a factor of 400!! The World Health Organization warns that the average human lead intake is already 70% of the "provisional tolerable intake". Recent work has found, however, that WHO's safety level should have been set much lower, meaning we're ALL now absorbing intolerable amounts of lead. As Rome fell, so falls mankind?
ADVANCED EXPERIMENTS It goes without saying that man's present state of knowledge and understanding is primitive. We have little idea of the fundamental relationships of time, space, action at a distance, life, and so on. There may be a "universal law" stating that research by an advanced civilization progresses in such a logical way that some test or experiment is normally performed that exceeds some limit and unexpectedly causes the civilization to be wiped out before it's had a chance to colonize outside its own planet or solar system. Science in the last few decades has progressed at a phenomenal pace. If there is a limit that we mustn't exceed, we're fast approaching it. We are now performing experiments wherein the value of certain parameters are seldom surpassed in the entire universe. For example, by means of the laser, recent techniques have produced magnetic and electric fields, energy densities, and temperatures that are found only at the center of our sun. Within decades we'll greatly surpass nature itself in many domains. Are we absolutely sure that some obscure physical effect won't chain react the earth right out of existence?
A further example - the race for the biggest high-energy particle accelerator could easily be the mechanism by which all life on earth is ended. After all, even back during World War II, farsighted people in the Manhattan Project made a cursory examination into the possibility that the 1st atomic bomb at Alamagordo might set off a chain reaction in the atmosphere. Such studies probably aren't being made today. The rush to publish and the need to cut corners, time-wise and money-wise, are the reasons.
1000 Gev particles from the Batavia Accelerator, and laser powers to trillions of watts, could initiate some catastrophe that man could never have hoped to predict. And of course, larger and more powerful devices are being planned. A form of bacteria has actually been found to live and reproduce in an operating swimming pool reactor. In addition, research has shown that several chemicals and vitamins increase the human body's ability to withstand the effects of nuclear radiation. Progress has been made in this field of radiation resistance and treatment on both sides of the Iron Curtain.
Now let's suppose the Russians make a great research breakthrough and discover how to enable their citizens to take 10 times the total radiation that the rest of the world's population can take. Would they precipitate a nuclear war? They would certainly consider it. What would they have done in 1945-7 if they had the atomic bomb and we didn't? And suppose they miscalculated and accidentally killed everybody off - or brought about some unpreclicted environmental runaway event that had the same effect? Not probable, but possible, and so another reason for a space colony.
" . . . science seems ready to confer upon us, as its final gift, the power to erase human life from this planet." Dwight D Eisenhower Inaugural Address – 1953 WORLD WAR III "Mankind must put an end to war - or war will put an end to mankind." J F Kennedy – 1961 But unquestionably there will be wars, there will be nuclear wars. International Communism versus "Imperialistic" Capitalism has been the cause of an enormous buildup of increasingly sophisticated nuclear weapons in Russia and the United States. And now several other countries have joined the buildup for whatever reasons they've found to justify nuclear capability. So will there be war ?
Five panelists at a 1975 Harvard-MIT Arms Control Seminar said they believed nuclear war in some form will erupt before 1999, originating most probably with a small nation in the Near East, Middle East, or Africa. The 3rd World nations, by the very fact they are backward, don't have the manpower, the finances, or the competence to properly care for their sophisticated nuclear weapons. Compared to the superpowers, 3rd World nuclear devices won't be as properly guarded, maintained, transported, or even deployed. Their leaders, from small, predominantly unqualified populations, chosen by so-so methods, advised by similarly deprived subordinates, and lacking such decision-aids as good communications and intelligence, may well drop nuclear devices on the basis of emotion, immaturity, or incorrect or badly translated information. And when one considers that there will be many more 3rd World nations joining the "club", each trying to outdo a neighbor, it becomes almost obvious that a nuclear war will be upon us well before 1999.

Extensions: Space Key To Survival (Multiple Threats)

Space colonization prevents human extinction from global nuclear war
Falconi, writer, physicist and consultant in computing and electro-optics**, 1981** (Oscar, "The Case for Space Colonization—Now!-and why it should be our generation's #1 priority," http://nutri.com/space/)

The recent series of crises in the Near East is just one line on our long list of possible catastrophes, any one of which might bring on the end. True, any single event may be improbable, but so is a hole-in-one or a royal flush. However, if lots of people play games for long enough, the improbable will happen sooner or later.
So the Arabs don't drop bombs on Israel. Maybe the Indians will drop some on Pakistan. Or the Chinese will drop some on Russia. Or Russia on the States. If it CAN happen, WILL it?
". . . a nuclear war by the end of the century is a distinct possibility." U.S. News and World Report - Mar 3, 1975
But if the superpowers have a war, a last rite for mankind is in order. The quantity of weapons involved is staggering. Take for instance just one weapon - the Trident: The United States Navy is presently working furiously on 10 Trident submarines. Each submarine will contain 24 missiles. Each missile will contain 17 independently targeted warheads. each warhead is capable of destroying a city, for a grand total of 4080 cities. 4080!! What with the Communist threat, these subs can be a valuable weapon, and in fact could actually be a great deterrent. However it's clear that, in the light of what we've been discussing, they could, by themselves, spell the end of life on earth.
We have that same dilemma: We must provide for our defense, but in so doing we bring man closer to his extinction. And so, the same answer: The perceptive few must alert the slumbering many to the necessity of a self-sufficient colony in space.

Space colonization will prevent extinction of the human species from the threats of environmental collapse and WMDs
The Space Review 2004 (Michael Huang, The Space Review-Online, "Sagan's rationale for human spaceflight," November 8, http://www.thespacereview.com/article/261/1)

Pale Blue Dot: A Vision of the Human Future in Space found a rationale that not only justified human spaceflight, but raised it to the highest importance. …every surviving civilization is obliged to become spacefaring—not because of exploratory or romantic zeal, but for the most practical reason imaginable: staying alive. It seems too simple to be true. The purpose of life in space is to survive. But this is true of all life, whether it is in space or on Earth. Every other purpose of life, even happiness, must defer to existence.
These are the missing practical arguments: safeguarding the Earth from otherwise inevitable catastrophic impacts and hedging our bets on the many other threats, known and unknown, to the environment that sustains us. In medieval times, some people kept a human skull in their home to remind themselves of mortality, and to view their priorities against the big picture of life and death. A modern equivalent is the dinosaur fossil. The fossilized remains of a once great and dominant species reminds the human species of our eventual choice: survival or extinction, or as Sagan put it, "spaceflight or extinction". A technological civilization that lives on the surface of a single planet has inevitable threats to its long-term existence. Current threats—impacts from space, nuclear or biological war—will be joined by new threats from emerging technologies. Even if all these threats are detected, solutions such as disarmament or relinquishment are incomplete or politically impossible. We will have to live with these threats, just as we have been living under the threat of nuclear war. This requires that we live in a way that will withstand a catastrophe if it occurs: living at multiple locations throughout the solar system, and living with the assistance of life-supporting technologies.
Space technology, despite its name, is not limited to space. Technology designed for the extremes of space can be used in any extreme environment. If a catastrophe made Earth hazardous for life, space technology will sustain life in space and on Earth. This is happening now. NASA aims to use spacesuit technologies in a suit for homeland security: a protective suit for environments contaminated with biological or chemical agents.Science cuts two ways, of course; its products can be used for both good and evil... The technologies that threaten us and the circumvention of those threats both issue from the same font. They are racing neck and neck.
This new race is not between nations or ideologies; it is a race between powerful technologies. Will we use science and technology to end life or support it? Intercontinental ballistic missiles or interplanetary launch vehicles, nuclear weapons or nuclear power plants, biological and chemical weapons or life support systems, weapons of mass destruction or technologies of mass life? What is Carl Sagan's vision? If we were up there among the planets, if there were self-sufficient human communities on many worlds, our species would be insulated from catastrophe… A cataclysmic impact on one world would likely leave all the others untouched. The more of us beyond the Earth, the greater the diversity of worlds we inhabit… then the safer the human species will be.There is a renewed effort—by governments, companies and individuals—for a small fraction of humanity to live independently beyond the Earth. One way to assist the colonization of the solar system is to spread Sagan's message to a larger audience.

Extensions: Space Key To Survival (Multiple Threats)

Space colonization is needed to escape numerous threats of extinction including nuclear war, natural disasters, and nanotech weapons
Stephens, author of *The Preparation: Space Colonization*, space and transhumanism expert**, no date given** (Rex, "Extinction Traps," http://www.thepreparation.com/Chap6.html)

Near Term Extinction Traps It is ironic that the advancement of human technology benefited mankind for millions of years, and now humanity is facing near term extinction from his advancing technology, just as mankind is on the threshold of becoming Godlike. Not many natural disasters would be capable of exterminating mankind in his present state of high technology. A nearby supernova or a very large asteroid impacting the Earth are the only known natural events that would drive man to extinction and both are unlikely events. There may be other unknown types of natural disasters which would have the same effect. A new human disease could develop through natural means, and if this new disease was deadly enough and had an ability to survive in the Earth's open environment for an extended period of time, the entire human race could succumb to the disease. It is unlikely such a disease would develop under natural conditions, but it is possible and more likely humans will purposely bioengineer such a disease.
The real threats to the extinction of man are manmade. The truth is disasters very seldom possess the ability to kill every human, but many disasters could easily kill a large percentage of the human population, perhaps even set mankind back a hundred years or more in technological advancement. While such setbacks won't be a disaster for mankind, mankind will recover, they are certainly a disaster for those who die. The extinction traps of man's own making: nuclear war, biological weapons, rogue nanites, ... the pleasure trap, and the power trap are all lined up and waiting to kill the unwary and the unprepared. None of us wants to be in the percentage of the human population that could be claimed by each of these extinction traps. Who ever wishes to survive needs to develop a survival strategy. Survival strategies will vary, but only the intelligent strategies will produce survivors. Choose wisely.
Avoiding The Extinction Traps The colonization of space is the best single preparation mankind can make for the coming extinction traps, and space is also the best place for man to evolve into something greater than man. Some of these extinction traps can be entirely avoided if mankind makes the proper significant advancements, most crucially the colonization of space. Other extinction traps can only be partially avoided because it is a personal choice and not up to mankind as a whole. To avoid this type of extinction trap, every individual will have to make the necessary significant advancements on their own. What follows is by no means a complete listing of the extinction traps facing mankind now and in the near future. The listing of extinction traps is merely meant to show how the colonization of space could reduce the mortality rate from each of these extinction traps and in some cases lessen the chance some of these extinction traps will occur in the first place.

HUMAN EXPANSION INTO THE SOLAR SYSTEM IS THE ONLY WAY TO ENSURE OUR SURVIVAL IN THE FACE OF CURRENT AND FUTURE WEAPONS TECHNOLOGY
HUANG, WRITER FOR SPACEFLIGHT OR EXTINCTION **2004** [SAGAN'S RATIONALE FOR HUMAN SPACEFLIGHT, http://www.thespacereview.com/article/261/1

In medieval times, some people kept a human skull in their home to remind themselves of mortality, and to view their priorities against the big picture of life and death. A modern equivalent is the dinosaur fossil. The fossilized remains of a once great and dominant species reminds the human species of our eventual choice: survival or extinction, or as Sagan put it, "spaceflight or extinction".
A technological civilization that lives on the surface of a single planet has inevitable threats to its long-term existence. Current threats—impacts from space, nuclear or biological war—will be joined by new threats from emerging technologies. Even if all these threats are detected, solutions such as disarmament or relinquishment are incomplete or politically impossible.
We will have to live with these threats, just as we have been living under the threat of nuclear war. This requires that we live in a way that will withstand a catastrophe if it occurs: living at multiple locations throughout the solar system, and living with the assistance of life-supporting technologies.

Extensions: Space Key To Survival (Multiple Threats)

Space colonization prevents genocide, ecosystem collapse, and extinction from nanotechnology weapons—creates safeguards against dangerous nanite testing and spread

Stephens, author of *The Preparation: Space Colonization*, space and transhumanism expert**, no date given** (Rex, "Extinction Traps," http://www.thepreparation.com/Chap6.html)

Technology Extinction Traps Nanites and their associated technologies have large potentials for creating extinction traps. Nanites can be used to purposely kill in innumerable ways. Generally these nanite weapons will not pose a threat to humanity as a whole since they will be designed to kill specific targets and not to kill indiscriminately. At one time or another every human has the potential of being in the target group of a nanite weapon or a nanotechnology derived weapon. Just as with nuclear weapons, being targeted does not necessarily mean you will have the weapon used against you, but you will have to prepare for such an scenario as if it absolutely will occur. Only nanoweapons could easily penetrate a hardened underground military facility and destroy it from the inside out. Only nanoweapons could pass undetected through several layers of security to target a single person in a crowd of thousands. Many countries at this time are embroiled in civil wars between rival ethnic groups; a nanoweapon could target a entire ethnic group for extermination, stopping at that nation's borders or continuing over the border in an attempt to kill every person of that ethnic group. Any group stupid enough to use such a weapon, is likely to find that their own ethnic group as well as a large percentage of Earth's human population, is much more closely related to that other ethnic group than they had thought possible. Only a nanoweapon can literally change someone's mind by implanting false memories and rearranging neural pathways. No need to work if you can convince some billionaire to give you all his money. No need to run for elected office if you can control the president. No need to fight a war if you can control your enemy's mind.
It would be in everyone's best interests to make sure ordinary nanites have built-in safeguards, to prevent to whatever extent is possible the modification of what were once "good" nanites for lethal purposes. Also, as is the case with nuclear weapons, human competition needs to be rechanneled to more productive pursuits in order to prevent someone from feeling the need to invent and use nanoweapons.Another serious nanite extinction trap is the rogue nanite trap. Rogue nanites are ordinary "good" nanites that have escaped from their human masters. The most common nanite of this type that always gets a mention in the nanite literature is the rogue dissembler nanite. Dissembler nanites are members of the builder nanite group. Dissembler nanites take things apart to provide the raw material needed to make something. Most advanced nanites will have the abilities of locomotion, self replication, and the ability to extract the energy they need from their environment. They are, in effect, alive. Life (even brainless life) tends to advance, and becoming a rogue nanite would be an advancement over remaining in human control. This escape would not be a conscious action by the nanite but it would have the same effect as a conscious action. The rogue nanite would be free from human control, able to spread throughout the Earth's ecosystem and multiply. If these rogue nanites were successful in the Earth's ecosystem (read: multiply at a rate faster than their depletion rate), they would wreak havoc on the Earth's ecosystem by disassembling everything in their path. It is conceivable that these rogue dissembler nanites could (if no way was found to stop them) destroy all life on Earth (except themselves) by disassembling it. Further, dissembler nanites could render the Earth uninhabitable by disassembling just a few key elements of the Earth's ecosystem, with out having to disassemble the entire upper crust of the Earth.
The best way to reduce the possibility of rogue nanites is build in several levels of dependency upon their human masters. Self-replication in nanites should have a built in shut down mechanism that would only allow self-replication when ordered by the human controller. Self-replication should be further limited to a specific number of copies no matter how many copies the controller orders. Nanites should always be designed to be dependent upon humans for their energy needs. Nanites should be programmed for just one specific job at a time and be required to shut down after a certain interval of time. All nanites should have one or more built in give away that allows humans to locate even one missing nanite, even if that nanite were no longer functional.
Even with every safeguard we can think of, nanites will on occasion pose a threat to humans and to life in general. Nanites designed to kill will of course not have the full compliment of safeguards. Various types of nanite detectors and nanite destroyers will have to be developed for our own protection. Some nanites will be designed to guard against other nanites. These guardian nanites should not be given self replication abilities (in case they go rogue). Nanotechnology is definitely worth the risk incurred. But we all have to be alert to the risk imposed by nanotechnology or we may force all life on Earth into the nanotechnology extinction trap. The colonization of space can help us avoid the nanotechnology extinction trap. Nanite detectors will be built into the structure of the space colony from the very beginning and guardian nanites will be added later as an additional layer of protection. On Earth guardian nanites would either interfere with the Earth's ecosystem or be unable to function because of interference by micro-organisms in the Earth's ecosystem. In space, research on potentially dangerous nanite types should be performed only on specially designed nanite research colonies, separated by large distances from any other colony. Earth doesn't have this advantage. Every place on Earth is connected to every place on Earth.The self-contained micro-environments on space colonies will be an protection, in addition to the nanite detectors and the guardian nanites, that would slow and in most cases stop the spread of rogue nanites and nanite weapons. Space is the only place you will want to be when nanotechnology is a mature technology.

Humans must expand into space—failure to do so will prevent evolution and cause human self-destruction

Engdahl, award-winning science fiction writer, **1994** (Sylvia, "Space and Human Survival, Part I," http://www.sylviaengdahl.com/space/survival.htm)

My novel The Far Side of Evil (Atheneum, 1971; updated version Walker, 2003) is based on the concept of a "Critical Stage" during which a species has the technology to expand into space, but hasn't yet implemented it, and in which that same level of technology enables it to wipe itself out. The premise of the book is that each world will do one or the other, but not both. I have believed this since the early 50s, when there was real danger of nuclear war but no sign of space travel. When the Russians launched Sputnik in 1957, my reaction was overwhelming joy and relief, because I thought that at last our energies were going to be turned toward space exploration. I felt that way through the era of Apollo. Since Apollo, as public support of the space program has waned, my fears have grown again; because I don't believe that a world turned in on itself can remain peaceful. A progressive species like ours has a built-in drive to move forward, and that energy has to go somewhere. Historically, when it was not going into mere survival or into the exploration and settlement of new lands—which is the adaptive reason for such a drive—it has gone into war.
This is the price we pay for our innate progressiveness. I know that it is now fashionable to deride the concept of progress, and certainly we cannot say that progress is inevitable. It surely doesn't characterize all change in all areas of human endeavor. Nevertheless, overall, the human race as a whole advances; if it did not we would still be cavemen. This is what distinguishes our species from all others. And like it or not, this drive is inseparable from the drive toward growth and expansion. Many successful species colonize new ecological niches; this is one of the fundamental features of evolution. When a species can't find a new niche, and the resources of the old one are no longer sufficient, it dies out. If the resources do remain sufficient, it lives, but is unchanging from era to era. There are no cases in biology of progressive evolution unaccompanied by expansion.

didn't think we had cards on that did you?

Extensions: Space Key To Survival (Multiople Threats)

Space is key to avoid extinction – absent colonization we will die out
CROUCH, ASTROBIOLOGIST, **2001** [CATASTROPHES AND HUMAN EVOLUTION, http://www.spacedaily.com/news/life-01b1.html]

Important mechanisms insuring the continuation of life's existence are adaptation, dispersion, and reproduction. Coupled with these mechanisms is life's prime motive, which is survival. Mankind's survival motive compels him to defend Earth from cosmic catastrophe unless the threat is overwhelming. If the threat is overwhelming mankind can disperse its kindred symbiotic life forms to live in or on habitats off the Earth. When this is done, humankind will have increased its chances of surviving a catastrophic cosmic collision, because people can then colonize the designed hospitable environment populated with living things that complement human existence. Consequently, since mankind has intellectually and socially evolved so as to acquire the ability to protect the Earth from minor cosmic catastrophes, and can expedite the dispersal of life to other planets if needed, these are uniquely fundamental survival roles in animal/human evolutionary development. In fact only humans have ever occupied the biological niche that is the playing of these roles and it seems evident that evolution has put mankind in the position to be planetary lifesavers.
The life on any planet will probably become extinct over time, if for no other reason than the death of the planet's sun. Therefore, unless interplanetary travel is used to disperse living things from this world, life from it will probably dead-end. The only evident design capable of assuring multiple and highly evolved species survival, through time and cosmic catastrophe, is the evolution of intelligent beings working in various specialized teams and functioning as a creative unit. It also seems evident that the beings must have at least the capability of developing a nuclear defense and interplanetary flight; thus they can occupy a unique biological niche and act as planetary lifesavers.
Consequently, intelligent beings capable of interplanetary flight and nuclear technology have evolved by way of natural selection, and as a result of life's prime motive, which is survival. It therefore seems evident that intelligent beings capable of space flight and nuclear explosive technology may not have evolved on this world, or possibly others, to just survive as a planet bound species. Instead it is probable that people have evolved to occupy the niche that could perpetuate the survival of evolved life by way of planetary protection and interplanetary dispersion. If this is not the case, then the human race is destined for a planet-bound extinction, either by its own doing or through some other disaster as has been the case for all of Earth's previous dominant species. Eventually, another species more capable than Homo sapiens will have an opportunity to develop, and the protection and dispersal of life from this world may take place. If not, life will probably dead-end on this planet as it might have on Mars.

SPACE EXPLORATION IS KEY TO SURVIVAL – AVOIDS EXTINCTION EVENTS
CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES 2005 [STILL UNTRODDEN HEIGHTS, CACHED IN GOOGLE, David Heyman, Senior Fellow and Project Director Vincent Sabathier, Visiting Senior Fellow Christian Beckner, Fellow and Project Manager Maïté Jauréguy-Naudin, Visiting Fellow Bhavini Patel, Research Scholar Kamal Bherwani, HSEI Advisor]

The final motivation for human space exploration is the survival of the human species. We know from the history of our planet and other celestial bodies in the solar system that cataclysmic activities – asteroid and comet strikes, volcanic activity – can cause massive devastation on a global scale and wipe out species from the face of the planet. Another asteroid of equal or greater magnitude to the one that made the dinosaurs extinct 65 million years ago will strike the planet Earth in the future – and it is not a question of if, but when. Human space exploration and settlement can be used as a contingency against this eventuality – and also as a first step to develop the capability to deflect an inbound asteroid from a collision with our planet.
On a shorter time horizon, the greatest threats to our survival come not from nature or the cosmos – but from our own human behaviors, both malicious and unintended. For example, the development of biological science in the last century has extended and improved the lives of billions; but it has also opened a Pandora's box of biological engineering, and the possibility that somebody could develop a lethal pathogen– accidentally or intentionally – that the human body could not defend itself against. Such a possibility could literally wipe out life on planet Earth as we know it, but self-sustaining colonies in space would be spared. The prospects from long-term environmental degradation and the proliferation of nuclear weapons and materials both compel a similar motivation for human space exploration, although on a less urgent scale.

Extensions: Space Saves Trillions

We must default to ANY CHANCE for space colonization – even a tiny reduced risk costs trillions of lives
Bostrum, Department of Philosophy, Yale University, Director of the Future of Humanity Institute at Oxford University**, 2002** (Nick, "Astronomical Waste: The Opportunity Cost of Delayed Technological Development," Preprint, Utilitas Vol. 15, No. 3, pp. 308-314, http://www.nickbostrom.com/astronomical/waste.html)

II. THE OPPORTUNITY COST OF DELAYED COLONIZATION From a utilitarian perspective, this huge loss of potential human lives constitutes a correspondingly huge loss of potential value. I am assuming here that the human lives that could have been created would have been worthwhile ones. Since it is commonly supposed that even current human lives are typically worthwhile, this is a weak assumption. Any civilization advanced enough to colonize the local supercluster would likely also have the ability to establish at least the minimally favorable conditions required for future lives to be worth living. The effect on total value, then, seems greater for actions that accelerate technological development than for practically any other possible action. Advancing technology (or its enabling factors, such as economic productivity) even by such a tiny amount that it leads to colonization of the local supercluster just one second earlier than would otherwise have happened amounts to bringing about more than 10^31 human lives (or 10^14 human lives if we use the most conservative lower bound) that would not otherwise have existed. Few other philanthropic causes could hope to match that level of utilitarian payoff. Utilitarians are not the only ones who should strongly oppose astronomical waste. There are many views about what has value that would concur with the assessment that the current rate of wastage constitutes an enormous loss of potential value. For example, we can take a thicker conception of human welfare than commonly supposed by utilitarians (whether of a hedonistic, experientialist, or desire-satisfactionist bent), such as a conception that locates value also in human flourishing, meaningful relationships, noble character, individual expression, aesthetic appreciation, and so forth. So long as the evaluation function is aggregative (does not count one person's welfare for less just because there are many other persons in existence who also enjoy happy lives) and is not relativized to a particular point in time (no time-discounting), the conclusion will hold. These conditions can be relaxed further. Even if the welfare function is not perfectly aggregative (perhaps because one component of the good is diversity, the marginal rate of production of which might decline with increasing population size), it can still yield a similar bottom line provided only that at least some significant component of the good is sufficiently aggregative. Similarly, some degree of time-discounting future goods could be accommodated without changing the conclusion.[7]
III. THE CHIEF GOAL FOR UTILITARIANS SHOULD BE TO REDUCE EXISTENTIAL RISK In light of the above discussion, it may seem as if a utilitarian ought to focus her efforts on accelerating technological development. The payoff from even a very slight success in this endeavor is so enormous that it dwarfs that of almost any other activity. We appear to have a utilitarian argument for the greatest possible urgency of technological development. However, the true lesson is a different one. If what we are concerned with is (something like) maximizing the expected number of worthwhile lives that we will create, then in addition to the opportunity cost of delayed colonization, we have to take into account the risk of failure to colonize at all. We might fall victim to an existential risk, one where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential.[8] Because the lifespan of galaxies is measured in billions of years, whereas the time-scale of any delays that we could realistically affect would rather be measured in years or decades, the consideration of risk trumps the consideration of opportunity cost. For example, a single percentage point of reduction of existential risks would be worth (from a utilitarian expected utility point-of-view) a delay of over 10 million years.

Space colonization will save humankind from self-destruction—it will save trillions of future live
Falconi, writer, physicist and consultant in computing and electro-optics**, 1981** (Oscar, "The Case for Space Colonization—Now!-and why it should be our generation's #1 priority," http://nutri.com/space/)

If man can populate the universe to a density of just one person per cubic light year, then, over the next 100 billion years, we can enjoy some 10-to-the-40th-power man-years. This is very conservative. From energy considerations the universe may be able to support as many as 10-to-the-60th man-years. We have used up about a trillion so far, leaving us over 9.99 x 10-to-the-59th man-years of productivity and happiness.
So, that is what may be at stake. If it were possible to know, it's certain that every yet-unborn person would appeal to us that we must, at all costs, assure his existence by immediately taking steps to prevent our self-destruction.
Life on earth will certainly cease to exist some day, but can we predict how soon? Unfortunately, every science (except mathematics) is based upon laboratory and field observations of the world as it's handed to us. The experimentalists are usually far ahead of the theorists who spend the great majority of their time trying to explain what has been observed. It's clear, since we're almost always one step behind in our understanding of the facts, that no advance warning of our imminent demise can be expected from the theorists.
Since our scientists can't enlighten us, what about our politicians? Can they somehow control the geometrically increasing indicators (population, energy, etc.) and peacefully level them out to a stable plateau? Or will there be some sort of earthly "big bang"? One might only predict from the manner in which world leaders have solved their problems in the past, and by judging the caliber of our leadership in the world today.
It may be that the only way we can have of predicting the time by which we should set up our colony is to look at the curves that depict these geometrically increasing indicators of impending disaster. These rates of increase surely cannot be maintained for many years - and so we must get on with the construction of space colonies - Now!

didn't think we had cards on that did you?

Extensions: Space Solves Coercion

Space colonization will enhance human freedom—Mobility allows individuals to escape governmental control
Ust, author and writer for The Thought, **2004** (Daniel, "Freedom Above or Tyranny Below," http://mars.superlink.net/~neptune/SpaceFreedom.html)

This argument is that space enhances freedom because it enhances mobility and stealth. Unlike the surface of the planet, with space there is no edge. It is virtually infinite, so increased mobility in space means an increased ability to move away from any power centers. (This happened on Earth as well. Edge societies tent to be freer than central societies. America comes to mind, but other cases include Iceland during its anarchic phase and Anglo-Saxon England. 1 The problem is, though, that eventually, the central powers either expand out into the edge or the edge societies themselves become new central powers. The former happened in the case of Iceland and the latter in the case of America.) It's not just the mobility factor, but the mobility combined with the three-dimensional movement in an edgeless volume. This introduces high costs to those who would track-down anyone fleeing centralized control. In simple mathematical terms, unless the fleeing parties tell you where they are, you have to search ever more space. To give an idea of how much, think of hiding a moving encampment on Earth. The surface of the Earth is about 185 million square miles. That might seem like a lot, but, chances are, if an existing powerful government wants to find that moving encampment, it will, given enough time. 2 Increases in mobility – faster aircraft, faster ships, vehicles able to travel over rough terrain – and advances in detection technology – better spy satellites, better surveillance equipment, un-piloted drones – will only make this task easier.
Imagine instead, that using the same level of technology, the government in question had to search the entire volume of the Earth. That would be about 237 BILLION cubic miles of space to search. That's a much larger space to search. (The surface can still be considered a space. Let's not quibble over geometrical terms. The point is searching the volume would be much harder – several orders of magnitude harder – than searching the surface or just the thing sliver of volume around the surface. Let's also leave aside the fact that anything in that volume will probably be on an orbit.)
Let's transfer this example to space. Imagine having to search the entire volume that contains the Earth out to the Moon's orbit. That's 240 thousand miles out. The volume is some 51 quadrillion cubic miles – over 200 thousand times the volume of the Earth. Note the Earth's radius is about 4 thousand miles while the radius of this volume is 240 thousand miles – in other words, only 60 times the radius of Earth. The difference is that the volume varies with the cube of the radius. That's a lot more space to search, but unlike Earth, this volume has no clear boundary. In fact, there is no physical limit to movement of the kind there is on the Earth's surface. This is not to say space settlements can violate the laws of physics, but their freedom of movement is much higher.
In this context, they are not constrained to that space. One can easily imagine, e.g., that a central government would get better at moving about in space and at tracking settlements and spacecraft. However, settlements and craft that don't want to be tracked can just move farther out. No matter how good the technology, it still faces the same geometric problem: the increase in distance increases the volume of space by the third. Put another way, double the distance one can move around in a given time and someone tracking you must monitor not twice as much space, but 8 times as much. The geometry is against the central power, against the would-be controller. (This applies to pirates and criminals as well. So, law enforcement would be harder overall. This can rightfully be seen as a downside.) Space, thus, is on the side of those who don't want to be monitored or controlled. Naturally, this does not guarantee that space settlement societies will be perfect in every respect, but higher freedom of movement and a higher de facto ability to secede will allow social and cultural evolution to move more in the direction of freedom because individuals and small groups can break away from larger political and social units. Even merely the higher potential for such secessions will likely make the larger units more tolerable of dissent, diversity, and experimentation. It also ruins the chances of individuals or small groups that desire to wield power over larger ones. Lacking any centralized machinery of power, there will be not as much destructive outlet for the power-hungry and the busy bodies.

Extensions: Space Key To AIDS Cure

Space research will find a cure for AIDS thorugh protein research and space experimentation
IOL News 2001 (Fienie Grobler, "Shuttleworth to research AIDS in space," December 4, http://www.iol.co.za/index.php?set_id=1&click_id=31&art_id=qw1007479981595B216)

South African multi-millionaire Mark Shuttleworth, 28, will conduct Aids experiments in space when he becomes the first African astronaut in April next year.Interactive Africa, which is handling Shuttleworth's communications, on Tuesday said four experiments had been short-listed for the African Space programme.
HIV attacks the immune system of the body, and one of the experiments will research the interaction of immune cells in a microgravity environment. The immune cell experiment will cost about R22 000 "In the war on disease, the frontline is within our bodies, where our immune cells interact with and (hopefully) attack the disease as it infects us," said Interactive Africa. However, scientists have to deal with the problem of size - the combatants are too small to observe directly. They have to study several pieces of evidence to infer what happens during the immune cell interaction. "One of the processes which helps with that is called SPC (Soluble Protein Crystallisation) which gives scientists a way to look at the weapons used by the immune system with an eye to knowing how to make them more effective."
The experiment will use the unique microgravity or weightlessness of space flight to attempt to create crystals of some of these human immune system proteins. "Crystallisation of the (receptor protein) under microgravity conditions could hopefully improve the quality of the crystals and allow higher resolution structures to be determined for the protein."
'I have always dreamed of space as a platform for inspiration' This experiment would also help understand other abnormally regulated immune reactions such as allergies, asthma and cancer as well as virus infections like ebola, measles and dengue fever which is transmitted by mosquitoes.

Extensions: Space Solves Environmental Destruction

Space colonization will prevent environmental destruction
Stephens, author of *The Preparation: Space Colonization*, space and transhumanism expert**, no date given** (Rex, "Immortality for sale," http://www.thepreparation.com/Chap1.html)

During economic booms the Earth's ecosystem will be protected to what extent it is practical to do so, and in economic recessions some of what was previously protected will be released to be exploited, until there is nothing left to protect. The environmental movement cannot stop the destruction of the Earth's ecosystem. Environmental activism can only delay the inevitable. For this delay and the education of the people of the Earth on environmental matters, the environmentalists should be commended! However it doesn't do anyone any good to fight the good battle for environmental responsibility and in the end loose the war. The environmentalists, and everybody else for that matter, need to find a permanent solution to the destruction of the Earth's ecosystem . We are all hypocrites, environmentalist and non-environmentalist alike. Environmentalists because humans are a part of the Earth's environment and human self-interest will always, always, take precedence over environmental preservation. Non-environmentalists because humans owe a great deal to every other type of life on Earth and human wants should never take precedence over the needs of non-humans. The only people who are not hypocrites are the selfish. The selfish say, "Humans have a God given right to exploit the Earth." or "I don't give a damn about the environment, I only care about myself." The selfish are wrong, but at least they are honest with themselves. There is only one solution. Humans must remove themselves from the Earth's ecosystem before they destroy it. We can build and colonize worlds of our own making in space. The asteroids alone represent enough building material to build over 1000 space colonies with a habitable surface area the same size as the Earth's (including the 72% of the surface covered by oceans). This is enough habitation space to allow the entire human population to live in any manner they wish, without infringing on the rights of others who want to live differently. The advantages of living in these space colonies will be delved into more fully in the following chapters. The colonization of space by humanity is inevitable. The only question is will we leave this Earth to colonize space because we want to save this place which gave us life from destruction, or will we leave because we have destroyed the Earth to such an extent it will no longer support us. Leaving before humanity destroys the Earth is the only moral path. To flee the Earth and all its troubles after we have plundered and pillaged the Earth to the fullest extent possible, would burden all mankind with a grievous sin, a sin so terrible we would never forgive ourselves. Our children would never forgive us. If there be other life in the universe and we eventually do make contact with older and wiser alien species, they will be appalled by what we did to our mother Earth and they will look upon all humanity with the utmost contempt and mistrust. These aliens will say to one another, "Humans had the ability to leave their birth place, take their place among the advanced races of the universe, and yet, they maliciously destroyed their mother when they could have saved her. What kind of selfish, arrogant and untrustworthy beings humans must be to be capable of doing such a dark deed."

Space colonization will reduce pollution, eliminate fossil fuels and mining, which is key to environmental protection
Ust, author and writer for The Thought, **2001** (Daniel, "For a Free Frontier: The Case for Space Colonization," http://mars.superlink.net/~neptune/SpaceCol.html)

Colonization will probably rely on more than just the funds and dreams of would-be colonists. There are a number of reasons to move into space aside from the romance. These include the available resources in terms of both energy (from the sun) and matter (from the asteroids and Earth's Moon), the lack of gravity, the space available and more. One plan that is still being studied is to use colonies to build solar power satellite stations (SSPS). These will supply Earth with cheap electric power. SSPSs would gather sunlight, change it into microwaves and then beam these down to collecting antennas on Earth's surface. The collecting antennas would then convert the microwaves into electricity for consumption. This would eliminate the need for fossil fuel, nuclear and hydroelectric power stations. Moving manufacturing to space is yet another payoff colonists can give to surface dwellers. This would not only lessen the pollution impact and the land use of factories but could possibly eliminate mining on Earth too. The ability to control the environment is much more flexible in space than on Earth. For example, the amount of "gravity" can be changed with current technology. Tailoring germ-free habitats is easier. Bioengineering of risky (on earth) organisms can be carried out with little or no fear of them escaping. The energy available in space from solar radiation is virtually continuous and waste free. These are some things that make space industry attractive in the long run.

Space colonization will provide electrical power that supports the economy and reduces pollution on Earth
Globus, Chairman of the National Space Society Space Settlement Advocacy Committee, September **2005** (Al, "Space Settlement Basics," September 22, http://www.nas.nasa.gov/About/Education/SpaceSettlement/Basics/wwwwh.html)

Solar Power Satellites. Electrical power is a multi-hundred billion dollar per year business today. We know how to generate electricity in space using solar cells. For example, the ISS provides about 80 kilowatts continuously from an acre of solar arrays. By building much larger satellites out of hundreds of solar arrays, it is possible to generate a great deal of electrical power. This can be converted to microwaves and beamed to Earth to provide electricity with absolutely no greenhouse gas emissions or toxic waste of any kind. If transportation to orbit is inexpensive following development of the tourist industry, much of Earth's power could be provided from space, simultaneously providing a large profitable business and dramatically reducing pollution on Earth.
Asteroidal Metals. John Lewis in Mining the Sky: Untold Riches from Asteroids, Comets, and Planets estimates that the current market value of the metals in 3554 Amun, one small nearby asteroid, is about $20 Trillion. There's $8 trillion worth of iron and nickel, $6 trillion worth of cobalt, and about $6 trillion in platinum-group metals. Once we can easily launch thousands of people into orbit, and build giant solar power satellites, it shouldn't be too difficult to retrieve 3554 Amun and other asteroids to supply Earth with all the metals we will ever need. Each of these steps is potentially profitable on its own merits. Once they are completed, we will be able to put people in orbit inexpensively, generate large amounts of power, and supply ample materials from NEOs and perhaps the Moon -- all the elements needed to build the first space colony.

Extensions: Space Solves Environmental Destruction

Space colonization will end pollution through alternate resource production and decreases in mining
Davidson, President of the Houston Space Society and member of the Atlantis Project," **1995** (Jim, "The Future We Want," June 1995, http://www.islandone.org/Policy/TheFutureWeWant.html)

The future which I want is one in which people have access to space. It is my vision that by 2050, tens of thousands of people are living in cities in space, on the Moon, and across the Solar System. In that future, the Moon has been thoroughly explored, surveyed, mapped, settled, industrialized, mined, and developed. The Far Side of the Moon is a haven for astronomers using huge optical and radio telescopes to survey the heavens. Very long baseline interferometry is possible using telescopes on the Moon and Mars as a baseline. Humanity is multi-planetary, with settlements on the habitable asteroids and Jovian moons. Comets have been visited and exploited. Some are talking about the stars. The first unmanned probe is sent towards the nearest star system, and more will follow. Most important, the industrialization of space has brought vast new resources to bear on the problems of Earth. Pollution is decreasing rapidly as energy from space makes the commodity price of electricity rather than oil the determining factor in the energy industry. Mining on Earth continues, but at a vastly reduced pace as lunar and asteroidal resources feed the industries of space which make far more of the technically sophisticated products of the future.

Extensions: Space Solves Environmental Destruction

Construction of a solar power station in space would solve an energy crisis and end global warming and environmental destructionfrom the greenhouse effect

Asimov, author, former president of the American Humanist Association, and biochemist, **2003** (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)

Of course, you might ask yourself what these settlements in space will do for us. Will we settle in space just to make Asimov happy? Is there any other purpose to it? Yes, there is, because we're going to do a great many things in space that we can't do on Earth. For instance, 10 years ago, there was an energy crisis that most of us, perhaps, have now forgotten. These days we hear about an oil glut instead. Well the oil glut exists only because there was a world recession; there still is a recession, as a matter of fact. If we recover economically, the demand for oil will increase, the glut will disappear overnight, and OPEC will raise its prices again. There is a limited amount of oil and coal in the Earth (a great deal more coal than oil), but we could make do with coal for centuries except that it is increasingly dangerous to use. Coal is difficult to dig out and transport, and burning it results in air pollution, produces sulfur and nitrogen oxides that dissolve in the atmosphere's moisture to produce the acid rain that is destroying life in our ponds and lakes and is killing our forests. But quite apart from all this, if we continue to burn coal indefinitely, we will increase that fraction of the atmosphere which is made up of carbon dioxide. At the beginning of this century, approximately 0.03 percent of the air was carbon dioxide. This amount has increased almost 50 percent since then, and it will probably double within another half century. There won't be enough carbon dioxide in the air to interfere with breathing, but it may produce what we call the greenhouse effect because it tends to be opaque to infrared radiation. Ordinary sunlight that shines on the Earth passes through the atmosphere with little absorption and hits the Earth's surface. At night, the Earth reradiates a portion of this energy as heat (infrared radiation). If the level of carbon dioxide increases even slightly, this infrared radiation will have more difficulty getting out. It will be absorbed by the carbon dioxide, thus heating the atmosphere and raising the temperature of the Earth very slightly. It won't take much heating to cause the polar ice caps to melt, thus changing the climate of the Earth, undoubtedly for the worse! If you think that nuclear energy has the potential to make the Earth unlivable, so has the indefinite burning of coal and oil. We are going to have to find some other sources of energy, and the only two sources of energy that will last as long as the Earth does are fusion energy and solar energy. I don't mean that we are going to have to depend solely on one or the other; there are other sources of energy that can be developed as well. There is geothermal energy, energy from under the Earth. There is biomass energy, the energy of the plant world. There is the energy of tides, wind, waves, and running water. All these can and will be used, but they are all relatively limited and there is no likelihood that they will supply all the energy we need. So, in addition to all these sources, we will need forms of energy that we can rely on in huge quantities forever. That brings us back to fusion energy and solar energy. We don't have fusion energy yet, although we've been working towards it for more than 30 years. We're not sure exactly what difficulties might exist between demonstrating it in the laboratory and developing huge power plants that will supply the world. We do have solar energy, but it's difficult to get in large quantities because it is spread thinly over the world. If we could get millions of photovoltaic cells (a kind of silicon cell that sets up a small electric current when exposed to light) and stretch them over half of Arizona (I only mention Arizona because there is usually a lot of sunshine there), we could perhaps supply enough energy for America's needs. If we did that in other parts of the world as well, we could supply the entire world. There is no doubt, however, that setting up solar cells (photovoltaic cells) on the Earth's surface is not very efficient. For one thing, there is no solar energy for the cells to absorb during the night. Even in the daytime under the best conditions (for example, in a desert area without fog, mist, or clouds), clear air absorbs a substantial portion of the sunlight, especially if the Sun is near the horizon. And of course, you also have the problem of maintaining these cells against nature's effects and against vandalism.

For these reasons it might be more reasonable to build a solar power station in space. Under such conditions, we could make use of the entire range of solar energy 98 percent of the time, because the stations could easily be positioned so they would fall into the Earth's shadow only 2 percent of the time, at the equinoxes. A chain of these stations around the Earth would allow most of them to be in the sunshine all the time. Optimists have calculated that in space, a given area of solar cells will provide 60 times more energy than on the Earth's surface. We can then imagine this chain of power stations circling the Earth in the equatorial plane at a height of approximately 22,000 miles above the Earth's surface. At this distance their orbital position will just keep time with the surface of the Earth as it rotates about its axes. If you stood on a spot at the equator and looked up at the sky with a sufficiently strong telescope, you could see the solar power station apparently motionless above you. I feel a certain proprietorship toward this idea of a space station. It was advanced about 20 years ago by people at the AVCO Corporation in Massachusetts, but about 40 years ago I wrote a story called Reason in which I talked about just such a power station. Of course, I missed the important point of having it in orbit around the Earth. I described it in an orbit similar to Mercury's around the Sun so that it could get even more energy. I ignored the fact that it would be awfully difficult to aim it at Earth from such a distance; in science fiction stories, you can dismiss such problems by saying that an advanced technology won't find it difficult to achieve. Nevertheless, solar power stations are my idea, and I'm proud of it!

Space colonization is key to protection of the earth's biosphere and avoids wars while supporting billions

Globus, Chairman of the National Space Society Space Settlement Advocacy Committee, September **2005** (Al, "Space Settlement Basics," September 22, http://www.nas.nasa.gov/About/Education/SpaceSettlement/Basics/wwwwh.html)

Growth Why build space settlements? Why do weeds grow through cracks in sidewalks? Why did life crawl out of the oceans and colonize land? Because living things want to grow and expand. We have the ability to live in space (see the bibliography), therefore we will -- but not this fiscal year

The key advantage of space settlements is the ability to build new land, rather than take it from someone else. This allows a huge expansion of humanity without war or destruction of Earth's biosphere. The asteroids alone provide enough material to make new orbital land hundreds of times greater than the surface of the Earth, divided into millions of colonies. This land can easily support trillions of people.

A Nice Place to Live A few features of orbital real estate are worth mentioning: Great Views. Many astronauts have returned singing the praises of their view of Earth from orbit. Low earth orbit settlements, and eventually settlements near Jupiter and Saturn, will have some of the most spectacular views in the solar system. Of course, all space settlements will have unmatched views of the stars, unhindered by clouds, air pollution, or (with some care) bright city lights. Low-g recreation. Consider circular swimming pools around and near the axis of rotation. You should be able to dive up into the water! Sports and dance at low or zero-g will be fantastic. For dancers, note that in sufficiently low gravity, always available near the axis of rotation, anyone can jump ten times higher than Baryshnikov ever dreamed. Environmental Independence. On Earth we all share a single biosphere. We breathe the same air, drink the same water, and the misdeeds of some are visited on the bodies of all. Each space settlement is completely sealed and does no share atmosphere or water with other settlements or with Earth. Thus if one settlement pollutes their air, no one else need breathe it.

Extensions: Space Key To Immortality

Space colonization allows for human immortality through the merging of humans with their computers
David, Senior Space Writer, **2001** (Leonard, "Uploading Life: Send Your Personality to Space," June 28, http://www.space.com/businesstechnology/technology/uploading_life_010618.html)

It sounds like New Age meets the Space Age. But one sociologist argues that uploading digital representations of our personalities and behavior into the cosmos rather than in-person star trekking is a form of space transportation worth thinking about.
Modest projects William Sims Bainbridge says there are several new data points to consider. He argued his case recently at a symposium on the past 40 years of human space exploration and beyond, organized here by George Washington University's Space Policy Institute. In his talk, Bainbridge "revisited" the spaceflight revolution, pointing out: No launch system breakthroughs can be expected soon in the field of space technology; Space industrialization is unimportant for post-industrial society; Fertility collapses in advanced nations remove population pressures for space colonization; Opinion polls show no growth in support for space program over the past 15 years; and The "space movement" has little influence, even as conventional space support groups are respectable. And "space religions" -- like Heavens Gate, The Solar Temple, or The Raelian Movement -- have been scorned and unpredictable. "Human beings have not left low Earth orbit since 1972, and for 30 years the emphasis in space has been on relatively modest projects," Bainbridge said. "Private enterprise and the general public have not endorsed Solar System colonization as a practical or worthy goal," he said.
Radical movement Bainbridge said he concludes that great progress cannot be achieved in space without radical ideas, motivations and actions of a new spaceflight social movement. To re-energize space progress, Bainbridge said that a "wholly new radical movement" might be required. That movement requires embracing new technology serving old and new motivations, he said. Several blossoming fields in science and technology, while seemingly remote to astronautics, can give space exploration a new edge, Bainbridge said. Specifically, these disciplines are cognitive neural science, genetic engineering, nanotechnology and information systems, he said. A melding of such powerful tools, Bainbridge said, may allow the founding of a cosmic civilization, a possibility that does not require flying living human bodies and all the necessities of life to other planets. By applying that diverse tool kit, we can overcome death. The gradual merging of human beings with their computers over the next century gives rise to the prospect of interstellar immortality, he said.

Space colonization can create eternal life with existing technologies—scientists can archive personalities to send across space
David, Senior Space Writer, **2001** (Leonard, "Uploading Life: Send Your Personality to Space," June 28, http://www.space.com/businesstechnology/technology/uploading_life_010618.html)

Archival arks The technology already exists to start archiving personalities, albeit at low fidelity. We can begin now to make digital, audio/visual copies of a person's perceptions, speech and behavior. In years to come, the ability to reanimate human personalities at ever-higher fidelity is a sure bet, Bainbridge said. That archive is what Bainbridge, author of the seminal work in the mid-1970s, The Spaceflight Revolution, calls Starbase. "Only a goal as valuable as eternal life can motivate investment in substantial scientific infrastructure on the Moon or Mars," Bainbridge said.
Starbase modules, filled with archived but active personalities of crew and colonists, could also make the first interstellar excursions. On their arrival, the crews need not waste time setting up terraforming operations. Rather, the colonists would adapt and thrive in whatever environment they are dealt. Follow-on waves of colonists can be dispatched as "radioed datafiles" across interstellar space, Bainbridge said. In future centuries, Starbase archives sent throughout the galaxy can be resurrected into robots, clones or cyborgs, Bainbridge said. By offering the stars to people living today, the second wave of the spaceflight movement would be spurred into being, Bainbridge said. The future demands a powerful, motivational force to create interplanetary and interstellar civilizations, he said, and a new spaceflight social movement can get us moving again.

Extensions: Space Key To Immortality

Technological development makes immortality possible—life-like technology systems will merge with living cells
David, Senior Space Writer**, 2001** (Leonard, "Uploading Life: Send Your Personality to Space," June 28, http://www.space.com/businesstechnology/technology/uploading_life_010618.html)

However, NASA itself has started to wrestle with the ethics of giving birth to "life-like" technologies and "living" systems.
Samuel Venneri, who heads NASA's Office of Aerospace Technology, sees up and down sides to the merging of nanotechnology with biology and information technology. He notes in a recent National Science Foundation report on the social implications of nanoscience and nanotechnology that "we will be building systems that become more and more 'life-like' and which interact with and support living systems at the cellular level."
On the other hand, Venneri added, life-like technology and systems are actually living systems, and that systems designed to interact with humans in a human-like manner might be viewed as being "too human."
"In the past, this has been the domain of science fiction," Venneri said. "In the foreseeable future, it could become reality. Our view at NASA is to be pro-active in developing ethical standards to make clear that we understand the accepted boundaries between true 'life sciences' and 'life-like' science," he said.

Space travel allows humans to create immortal clones for interstellar development
David, Senior Space Writer**, 2001** (Leonard, "Uploading Life: Send Your Personality to Space," June 28, http://www.space.com/businesstechnology/technology/uploading_life_010618.html)

In his new book, Spacefaring - The Human Dimension, Harrison cites several proposals by deep space thinkers that question the need for human migration to the stars. That includes hurling starbound super-powerful computers that are surrogate brains, packed with personality, a sense of self, memory, and other psychological qualities.
"The beauty of this, if it worked, is that there would be no need for life support as we normally think of it," Harrison said. Star-leaping clones of the human mind would make the voyage, long after the physical bodies they represented had perished, he said.
Yet another popular idea, Harrison recounts, is merely sending a probe filled with genetic codes from Earth, along with a way to cultivate that life upon arrival. Eventually, intelligent life forms would begin to develop. This approach allows seeding life throughout the galaxy without the messy drudgery of protracted human voyaging, he notes.
"There are many conceivable paths to interstellar migration, and the ones that we actually will tread, if any, remain to be seen," Harrison concludes.

Extensions: Space Key To Solve Warming

Space combustion technologies will reduce pollution and global warming
NASA 2006 ("Space Station Science: Zero G," May 16, http://aerospacescholars.jsc.nasa.gov/HAS/cirr/ss/5/3.cfm)

Considering that combustion is the catalyst for 85% of the world's energy needs and a major contributor to air pollution, science has a remarkably limited understanding of many of its fundamentals. In space, microgravity joins oxygen, ignition point and combustibles as a major combustion variable. Scientists will use this unusual combination in an effort to find ways of increasing combustion efficiency, to reduce pollution, global warming, and production and transportation costs.
The Combustion Science element includes investigations of a wide range of fundamental combustion processes, development of rational design procedures for maximizing efficiency and minimizing pollution associated with combustion processes on Earth, development of novel methods for materials production via combustion, improvement of fire safety at reduced gravity conditions, and development of combustion-related technologies which will aid in the human exploration of space.

Space exploration through private market development will solve global warming—allows for development of a solar shield
Foust, editor and publisher of The Space Review and Space Politics, November **2005** (Jeff, The Space Review, "Exploiting the Moon and saving the Earth," http://www.thespacereview.com/article/490/1)

All those ideas, though, paled in comparison to what Worden described next: a solution to the problem of global warming. Although not addressing the causes of global warming—natural, man-made, or some combination—he saw three solutions to the problem. One is to roll back technology "and live the way we did a century ago", an alternative that most, including Worden, would find unpalatable. The second is to reduce greenhouse gas emissions through the use of alternative fuels, nuclear power, and the like. While this has "great potential", he noted, this approach is also fraught with "political issues" that could hinder their adoption.
The third, as Worden modestly put it, is to change the fundamental physical constants of the universe. That might seem outlandish at first—Worden likened it to something that Q, the omnipotent nemesis from the Star Trek universe, would do—but what he really had in mind was the solar constant, the amount of sunlight that falls on the Earth. That value isn't really constant, and has changed over time. Moreover, Worden believes it's possible for humans to change it. Worden's solution is deceptively simple: erect a shield at the Earth-Sun L2 point, about 1.5 million kilometers from the Earth in the direction of the Sun. A shield about 1,600 kilometers across would be sufficient to block two percent of the incident solar radiation, decreasing the solar "constant" and thus solving the global warming problem. The general idea itself is not that original: Worden credited a paper by James Early in the Journal of the British Interplanetary Society in the late 1980s for the concept. Worden's implementation would be a massive undertaking, featuring 10 billion spacecraft, each 14 by 14 meters across, arrayed in a three-dimensional checkerboard. The heart of each spacecraft would be a thin block of dispersive glass, weighing no more than one kilogram, manufactured on the Moon. In reality these spacecraft would be transparent, Worden explained: rather than blocking sunlight they would instead disperse it by about one degree, enough to miss the Earth. Worden said that such spacecraft could be manufactured on the Moon, but would require a major industrial base: 1,000 factories on the lunar surface that each produces 1,000 spacecraft a day for 30 years. He estimates the total cost for such a system to be in the "few trillions" of dollars. That cost doesn't assume any significant decrease in the cost of space access: he estimates that each factory will require between one and ten tons of material from the Earth, which could be launched from the Earth for all 1,000 factories for well under one trillion dollars even at a typical contemporary launch cost of $20,000 per kilogram.
"We have to start thinking about space as a solution," he said. "This is an idea whose time has come." Nonetheless, with costs of that order of magnitude, one might imagine that such a venture would be solely within the domain of governments. Worden, though, sees private enterprise taking the lead. In a system analogous to the land grants awarded to the builders of the transcontinental railroad, companies that deploy such systems would qualify to receive "carbon credits" for mitigating the effects of atmospheric carbon dioxide, such as those proposed under the Kyoto Protocol. A system of 324 spacecraft alone, Worden estimates, would be worth 6,000 tons of carbon credits. Those credits could then, in turn, be sold on the open market. The result is a system that could be, in Worden's opinion, "self-financing", although how much such carbon credits will be worth is an open question.

Extensions: Space Key To Solve War

Space colonization prevents nuclear extinction by ensuring second strike abilities and decreasing possibilities for war
Falconi, writer, physicist and consultant in computing and electro-optics, **1981** (Oscar, "The Case for Space Colonization—Now!-and why it should be our generation's #1 priority," http://nutri.com/space/)

MORE BENEFITS OF COLONIZATION Unfortunately, the U.S. is in the position of having to strike only after being struck first. A situation could arise where we'd be reluctant to retaliate because more radioactivity injected into the atmosphere by us, even over Russia, could end all human life on earth. By having a self-sufficient backup colony, capable of recolonizing the earth at a future time, we'd eliminate this reluctance. By knowing beyond doubt the U.S. is fully committed to a 2nd strike, come what may, the Russians would be less wont to initiate their first strike. It's tragic that we humans, capable of love and the appreciation of life and nature, must think in these terms. However, the Russian-American policy of Mutual-Assured-Destruction (MAD) requires it.
Thus a space colony results in 2 more benefits:
(1) the probability of an atomic war is decreased, and
(2) if there is a war, the probability is greater that human life will survive.
Yes, the Russians could try to destroy our colony, but the questionable rationale and complicated logistics of such a pointless act of war would need further study. The best solution to this dilemma might be to construct a double space colony, the two halves being dependent upon each other for mechanical balance and stability, one half built and populated by the west and the other half by the east. Such a configuration has in fact been designed: It consists of two parallel contra-rotating cylinders, connected side by side, each about 4 miles in diameter and 20 miles long. The destruction of one cylinder would soon mean the end of the other, along with its thousands of inhabitants. Such an arrangement just might spell peace and save our civilization.
And finally, the U.S. is moving aimlessly - no national goal. Our moon landing was merely a victory that hasn't been followed up, a victory in name only. A commitment toward space colonization will put spirit back into America. People will once again be proud to be patriotic Americans. Any further benefits to our technology, our economy, unemployment, the energy shortage, etc., are bonuses of incalculable value, not to mention the preservation of the human race.

A2: Long Timeframe To Space

Space colonization is possible—We'll be on Mars in 10 yeras
Kluger, author and senior writer for Time Magazine, **2004** (Jeffrey, Time, "Mission To Mars," January 26, http://time-proxy.yaga.com/time/archive/printout/0,23657,993168,00.html)

Having rung the Mars bell, however, the current Bush Administration may find it's not possible to unring it. Even if it's true that the President's announcement was nothing more than a bit of election-year candy, it's getting some very serious attention from some very smart people. Mars, they're concluding, is not out of reach for human beings--and it need not take decades to get there. Indeed, there may be any number of possible routes to the Red Planet that could, some say, have boots on the soil in as few as 10 years. All that's needed is the commitment to go--and the institutional maturity to see that commitment through.

Space colonization is possible within the next decade
Space Online 2002 (Leonard David, Space writer, "The Moon Or Mars: Which Shall It Be?" January 28, http://www.space.com/news/moon_or_mars_020128-1.html)

"We want to create a new society and that's all there is to it. I believe we should commence, essentially immediately, a program to send humans to Mars. I think we can have humans on Mars within 10 years. We already know more about Mars than they knew about the Moon in 1961," when then President Kennedy green-lighted America's quest to send humans to that world.
"We are certainly prepared to initiate a humans-to-Mars program now," Zubrin said. Initial sojourns back and forth to the Red Planet will set the stage for more extensive bases. "Once we can become self-sufficient on Mars, then I think we can start colonizing Mars," Zubrin concluded.

Moon colonization is possible by 2010
Space Online 2002 (Leonard David, Space writer, "The Moon Or Mars: Which Shall It Be?" January 28, http://www.space.com/news/moon_or_mars_020128-1.html)

Moon base in 2010 "Going to Mars is going to require a political decision on the part of some government," said Douglas O'Handley, a space engineer for Orbital Technologies Corporation in Madison, Wisconsin. "Frankly, I don't think we're there," he argued.
On the other hand, getting to the Moon on a commercial basis is conceivable in the near future, O'Handley said. "I think a lunar base can be established by 2010 as the next step. It's doubtful whether it's going to be the United States that does it, unfortunately."
O'Handley reported on the results of a recent study on a self-sustaining lunar base. That lunar colony would manufacture raw materials and build structures for use on the Moon, building up transportation infrastructure, as well as produce oxygen, nitrogen, carbon dioxide, water and food for life support and export elsewhere. "The colony would be considered "self-sustaining" when it can achieve the goal of surviving without any supplies from Earth for a period of 52 months," O'Handley reported.

Life in space is possible by 2015 through plant development of the Moon
Space Daily 2005 ("Tulips on the Moon," June 29, p.lexis)

So the first step to bring life to the Moon would be to grow bacterial colonies, with precursor experiments such as FEMME, followed by more advanced life science experiments on the upcoming lunar landers. We believe this could be done sometime between 2010 and 2015.
What we learn from that can teach us about the problems of growing plants, and developing greenhouses on the Moon. After that, we could consider the next steps to take for animal life and then human. This is how we are going to develop sustainable systems for future human bases on the Moon.

Funding and technology will make space colonization possible within the next decade
Ust, author and writer for The Thought, **2001** (Daniel, "For a Free Frontier: The Case for Space Colonization," http://mars.superlink.net/~neptune/SpaceCol.html)

It's one thing to show what is possible and another to show when it will happen. One could argue the technology needed for Spain to cross the Atlantic Ocean had been around for years before Columbus, but this in itself did not cause that historic expedition. On the other side of the ledger is economics. We need not only the skill but the money to colonize space. In this regard, out of the above list, small scale colonization is not only the most feasible technologically but also economically – at least in the short run. In the long run, other forms of colonization might overtake it because of economics of scale. Still, we should be wary of making long-range predictions. (Would people living in the sixteenth century have been able to predict even roughly the way American colonization would take shape?) I think this points to space colonization in the next few decades.

didn't think we had cards on that did you?

A2: Inter-Stellar Travel Impossible

Interstellar travel is possible
Gonzalez in '98
(Guillermo, Astronomer at University of Washington , Society, "Extraterrestrials: A modern view", July/August, Volume 35, Issue 5, Proquest)

Another possible criticism of galactic-scale colonization is that interstellar travel is yet to be realized and might even be impossible. However, most experts agree that we are in fact not far from interstellar travel. Several studies published in the Journal of the British Interplanetary Society in the last three decades have shown the feasibility of building interstellar probes using current (or foreseeable) technology. In fact we have already sent a few probes beyond the most distant planets in the Solar System (i.e., Pioneers 10 and 11 and Voyagers 1 and 2). It should take no more than about a century before we can build Von Neumann machines and send them to nearby planetary systems. If ETIs are anything like us, they will be capable of interstellar travel only a few centuries after first developing the capability of interstellar communication. Hence, the first series of interstellar probes sent by ETIs are likely to resemble our present technology to a significant extent, and so we should be able to recognize them in our Solar System. Our ability to detect extrasolar planets (as of October 1995) is also a significant step on the way towards interstellar exploration. Before we send out interstellar probes, we will need a target list at hand to avoid wasted missions. Conversely, the presence of a huge planet like Jupiter in our Solar System means that ETIs can detect it using technology similar to ours. Therefore, the Solar System should have been targeted for exploration by any nearby ETI. This leads us to another important point: ETIs can concentrate their efforts on only the most suitable targets. No doubt, our system would receive high priority.

Faster-than-light space travel makes rapid space colonization feasible and likely—it is consistent with the laws of physics
Crawford, Department of Physics & Astronomy, University College London**, 1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

There are reasons for believing that faster-than-light (FTL) interstellar space travel may be consistent with the laws of physics, and a brief review of various FTL travel concepts is presented. It is argued that FTL travel would revolutionize the scientific exploration of the Universe, but would only significantly shorten the Galactic colonization timescale from the io6 years estimated on the assumption of sub-light interstellar travel if the mass-production of FTL space vehicles proves to be practical. FTL travel would permit the development of interstellar social and political institutions which would probably be impossible otherwise, and may therefore strengthen the' zoo hypothesis' as an explanation for the apparent absence of extraterrestrial beings in the Solar System.
1 INTRODUCTION For many space exploration and colonization projects that we might wish to undertake in the future it would be a great help if space vehicles could travel faster than the speed of light. It is true that orthodox scientific opinion, based largely on a narrow interpretation of the special theory of relativity, holds faster-than-light (FTL) travel to be impossible, but is this necessarily so? While it may come as a surprise to many, the truth is that contemporary physics is not able to answer this question with any degree of confidence. We simply do not know whether FTL travel is possible. However, we do know, contrary to some widely held opinions, that FTL travel does not necessarily conflict with the special theory of relativity (e.g. Bilaniuk, Deshpande & Sudarshan 1962, Feinberg 1967), and we have some grounds for believing that it may also be consistent with the general theory of relativity (e.g. Fuller & Wheeler 1962, Morris & Thome 1988, Alcubierre 1994). Indeed, the FTL stretching of spacetime is now considered orthodox within the context of inflationary cosmologies (e.g. Linde 1990, 1994). We may perhaps also note that there are philosophical reasons, arising from consideration of the separability of quantum systems, for considering that the FTL propagation of information (or, at least, of quantum mechanical influences) may occur (d'Espagnat 1979).
Given that we are currently unable to rule out the possibility of FTL travel and communication, it may be worth considering some of the implications should these turn out to be achievable in practice. This is the purpose of the present paper. However, before proceeding to a discussion of these issues, it will be helpful to provide a review of some of the key FTL travel concepts which may be found in the literature.

A2: Inter-Stellar Travel Impossible

Faster-than-light space travel is consistent with the theory of relativity—it doesn't violate causality
Crawford, Department of Physics & Astronomy, University College London**, 1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

Figure 1 shows the relativistic factors y-=i/y/(i — p2), and F = I/V(P2~I)5 for sub-light particles and tachyons, respectively (where P = v/c). Thus, we see that while the energy and momenta of sub-light particles are monotonically increasing functions of v over the range 0 < v < c, for tachyons they are decreasing functions over the range c < v < 00.
From the foregoing it will be seen that, far from denying the possibility of FTL particles, there is a sense in which the special theory of relativity actually predicts their existence. The reason why special relativity is said to preclude FTL travel is because, under certain circumstances, it also predicts that such particles may travel backwards in time, in violation of the principle of causality. However, it must be clearly understood that there is a large parameter space within which FTL space travel may occur without impinging on the principle of causality.
The time travel problem arises when relative motion is introduced between observers exchanging tachyons (e.g. Feinberg 1967). For example, consider two observers, A and B, separated by a distance x0 at time t = 0, with B moving away from A with a velocity u(< c) in the direction of increasing x. Let A emit a tachyon having velocity v(> c) towards B at t = 0. If, upon reception of this tachyon, B then emits a second tachyon back towards A (with velocity — v in B's frame), the Lorentz transformation of velocities shows that this second tachyon will be received by A at a time It is instructive to plot trec as a function of u for different tachyon velocities, v, and this is done in Fig. 2. For u = 0, /rec = ixjv, which is exactly what we would have expected (i.e. the time taken is equal to the total distance travelled divided by the tachyon velocity), and no violation of causality will occur even though v > c. However, there is a critical value of u, above which tachyon velocities which previously did not give rise to causal anomalies will now do so (i.e. tTec will become negative). As we might expect, this critical value of u is lower (i.e. causality violation is easier) for higher tachyon velocities. Note that as u tends to c, trec tends to —xo/c for all tachyon velocities, so a causal anomaly will always be possible for a sufficiently large relative velocity between the observers. However, while we may (tentatively) accept the principle of causality, it is clear that arguments based upon it relate only to time travel, and not to FTL space traveller se. For example, we might follow Birch (1984) and Hawking (1992) and conjecture that physical mechanisms exist to prevent time travel, while permitting FTL space travel in those cases where causality violation is not an issue. As pointed out by Birch (1984), this suggestion is not as ad hoc as it may at first appear: the principle of causality absolutely requires the existence of some such mechanism, and whatever Nature's speed limits eventually turn out to be, if these are based on the principle of causality, they will be far from arbitrary.

Traversible wormholes and faster-than-light travel enable rapid spaceship transportation
Crawford, Department of Physics & Astronomy, University College London, **1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

2.2 Wormholes It has been known for some time that general relativity predicts the possible existence of 'wormholes', topological tunnels which connect distant parts of the Universe (e.g. Fuller & Wheeler 1962; see also Morris & Thome 1988, and references therein). In principle, such tunnels through spacetime might permit FTL travel, in the sense that a spaceship might use them as shortcuts to travel between two points faster than a beam of light could do if it ignored the wormhole. Fuller & Wheeler (1962) explain it thus: There are alternative routes for a disturbance to pass from a point A to a point B. A disturbance going by one of these routes as fast as it can - at the speed of light* - may arrive only to find itself outpaced by a disturbance which has gone through a handle or 'wormhole' and a much shorter path.
Morris & Thorne (1988) have given a very useful summary of the various types of wormhole permitted by general relativity, together with a discussion of the theoretical and practical objections to their use for interstellar travel. The main problem appears to be that most wormhole solutions are unstable against small perturbations, and therefore any attempt to pass something through (even a photon, never mind a space vehicle) would cause the wormhole to collapse before whatever entered had a chance to emerge from the other side. This objection was effectively eliminated by Morris & Thorne (1988), who identified solutions to Einstein's equations which describe traversible wormholes: that is to say, wormholes that may remain permanently open, which would impose only modest tidal forces and radiation fluxes on a spaceship passing through, and which would permit two-way travel with rapid transit times as seen by both the travellers themselves and external observers.

A2: Inter-Stellar Travel Impossible

Warp drives make faster-than-light space travel possible within the current framework of relativity laws
Crawford, Department of Physics & Astronomy, University College London**, 1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

2.3 Warp Drive The debate concerning the feasibility of FTL travel within the context of general relativity has recently taken a new turn with the work of Alcubierre (1994). Alcubierre attempts to demonstrate the theoretical possibility of distorting spacetime ahead of and behind a space vehicle, in such a way as to permit it to travel at superluminal velocities as measured by observers outside the distorted region-quite literally a 'warp drive'! By distorting spacetime in this way, wormholes are not required in order to achieve FTL travel. As Alcubierre puts it: the fact that within the framework of general relativity and without the need to introduce non-trivial topologies (wormholes), one can actually make... a round trip in an arbitrarily short time as measured by an observer that remained at rest will probably come as a surprise to many people.
While this may indeed come as a surprise to those brought up on special relativistic strictures against FTL travel (strictures which are themselves at least questionable, Section 2.1), Alcubierre points out that a not dissimilar state of affairs is actually orthodox in modern cosmology. During the inflationary period of the early Universe the relative speed of separation of co-moving observers (defined as the rate of change of proper spatial distance divided by proper time) was much larger than the speed of light, where "the enormous speed of separation comes from the expansion of spacetime itself". Alcubierre's 'warp drive' would rely on a different manifestation of the same phenomenon, albeit one somehow contrived artificially.

Technological advancement makes FTL travel possible
Crawford, Department of Physics & Astronomy, University College London**, 1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

It is of course true that no one currently has any idea how to exploit the ideas sketched above in order to achieve FTL travel in practice. No one has any idea how to build a warp drive, or construct a wormhole, or turn a spaceship and its crew into tachyons. However, the essential point is that achieving FTL travel may be theoretically possible even within the laws of physics as currently understood. Moreover, there is no reason to assume that our present understanding of the physical world is anything like complete -the whole history of scientific discovery leads us to expect that major new discoveries lie ahead, some of which (especially any relating to higher dimensions, the nature of spacetime, quantum gravity, and the various ' goings on' in the quantum vacuum) might have a significant bearing on the possibility and practicality of FTL travel. In any case, if FTL travel should turn out to be theoretically possible, the question of practicality is essentially a technological one, which we are free to speculate might be solved by a sufficiently advanced civilization.

Faster-than-light travel technologies allow for space colonization inside and outside our galaxy
Crawford, Department of Physics & Astronomy, University College London, **1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

3 THE IMPLICATIONS OF FTL INTERSTELLAR SPACE TRAVEL We now turn to a discussion of the implications of FTL interstellar space travel should it prove to be attainable. We can identify significant implications for the scientific exploration of the Universe, for the cultural development of humanity, for the colonization of the Galaxy, and for the search for extraterrestrial intelligence (SETI). 3.1 Implications for scientific exploration It is easy to see that FTL interstellar space travel would have profound implications for the scientific exploration of the Galaxy. In an earlier paper (Crawford 1990) I have argued that, just as our knowledge of the Solar System has been vastly enriched by our ability to send space probes to other planets, so the rest of astronomy would benefit enormously if it were possible actually to visit more distant astronomical objects. Moreover, it is not only astronomy that would benefit, or even the physical sciences generally, but essentially every scientific discipline. In particular, we may expect that the science of biology would undergo explosive new developments resulting from the discovery and study of alien lifeforms. It is true that FTL travel is not a prerequisite for interstellar space travel, and that a great deal of useful scientific exploration could be carried out using vehicles travelling at sub-light, semi-relativistic, velocities (for reviews of possible sub-light propulsion methods see Mallove & Matloff 1989 and Crawford 1990). However, while sub-light interstellar travel would permit scientific data to be returned from the nearer stars in a matter of decades, many of the most interesting astrophysical objects (O type stars, red giant stars, interacting binary stars, planetary nebulae, galactic nebulae, supernova remnants, star-forming regions, neutron stars, black hole candidates etc.) lie at such great distances (anywhere from a hundred parsecs up to several kiloparsecs) that direct investigation based on sub-light interstellar travel would take millennia. On the other hand, the prospects for the direct investigation of distant astronomical objects would be immeasurably improved if significant FTL velocities could be attained. In this case, a small number of FTL interstellar probes (and automatic probes would be sufficient for most purposes) would be able to make in situ observations of representative examples of a wide range of astrophysical objects, perhaps in a matter of years. Moreover, if, as hinted at by Alcubierre (1994), round-trip travel times could be made arbitrarily short, there would be no reason to restrict destinations to within the Milky Way Galaxy, making it possible to visit representative examples of some of the most important extragalactic objects.

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A2: Inter-Stellar Travel Impossible

The ability of space travel makes galactic colonization inevitable—the only question is timeframe
Crawford, Department of Physics & Astronomy, University College London, **1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

3.3.1 Galactic colonization timescales. If the Galaxy is indeed lacking in other intelligent technological species, then it is very likely that human beings (or our evolutionary descendants) will eventually colonize a significant fraction of it. This conclusion does not depend on the feasibility of FTL travel, as sub-light interstellar spacefiight will be quite adequate for the task (Hart 1975). Thus, barring any major disasters which may prevent us from leaving our home world within the next century or so, humanity may expect eventually to inherit the Galaxy.
The extent to which the timescale of galactic colonization would be shortened by the availability of FTL travel depends on the colonization strategy adopted, and, in particular, on the ease with which FTL starships could be mass-produced. In models of colonization which rely on sub-light interstellar travel, it is generally assumed that a colonization wavefront advances through the Galaxy as a result of each new colony sending out colonists of its own.

Faster-than-light space travel shortens the timeframe for space colonization
Crawford, Department of Physics & Astronomy, University College London, **1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

On the other hand, if it were possible to mass-produce large numbers of FTL space vehicles in the Solar System, galactic colonization could proceed without having to wait for colony worlds to establish their own interstellar spacefiight capability. In this case the resulting colonization timescale might be very much shorter, as it would be possible to colonize other star systems just as quickly as we could build the starships. For example, if we were able to do this at the rate with which we currently produce motor cars (of the order of io7 year"1) then the colonization timescale would be io4 years if each space vehicle was used only once (and ^ io3 years if each vehicle was reusable with a turn-around time of a few decades).

Rapid space travel allows for construction of coherent communities over large distances—this ensures peaceful contact with alien lifeforms
Crawford, Department of Physics & Astronomy, University College London, **1995** (I.A., "Some Thoughts on the Implications of Faster-Than-Light Interstellar Space Travel," March 8, Q.J.R. Astr. Soc. 36, p. 205-218)

On the other hand, if FTL interstellar travel were possible, and especially if travel times could indeed be made almost arbitrarily short, it would then be possible to maintain social (and perhaps also biological) coherence over large, perhaps arbitrarily large, interstellar distances. This would make possible social, cultural and political institutions on interstellar (perhaps even Galaxy-wide) scales, in a way which would be quite impossible otherwise. In particular, it would permit some degree of central political control over the entire colonization process: FTL travel would, at least in principle, make possible Galactic Empires (e.g. Asimov 1950) and/or Federations (e.g. Roddenberry 1966), although it must be admitted that at some point the sheer number of colonies would pose a major problem in political organization, and one suspects that a federal structure would cope much better than a highly centralized imperial one.
The possibility of interstellar political institutions will be seen to be particularly important if we consider the interaction of humanity with planets harbouring indigenous lifeforms (and here I have in mind worlds inhabited by micro-organisms, as was Earth for most of its history, as much as anything more complicated). We may all agree that interference with such worlds would be morally wrong, but it seems very unlikely that a sub-light (and therefore necessarily unstructured) human expansion into the Galaxy could long maintain a policy of non-interference towards any alien lifeforms which might be encountered. Only the interstellar institutions made possible by FTL travel would permit the widespread implementation of such a policy.

A2: Inter-Stellar Travel Impossible

Space travel is technically feasible—current technologies allow for launch vehicle and thermal rocket travel
Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics, **1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

The difficulty of interplanetary travel may make Mars colonization seem visionary. However colonization is, by definition, a one way trip, and it is this fact which makes it possible to transport the large numbers of people that a colony in a new world needs to succeed. Let us consider two models of how humans might emigrate to Mars; a government sponsored model and a privately sponsored model. If government sponsorship is available, the technological means required for immigration on a significant scale are essentially available today. In fig. 2 we see one version of such a concept that could be used to transport immigrants to Mars. An Shuttle derived heavy lift launch vehicle lifts 145 tonnes (A Saturn V had about this same capacity) to low Earth orbit, then a nuclear thermal rocket (NTR, such as was demonstrated in the USA in the 1960's) stage with an Isp of 900 s hurls a 70 tonne "habcraft" onto a 7 month trajectory to Mars. Arriving at Mars, the habcraft uses its biconic shell to aerobrake, and then parachutes and lands on its own sets of methane/oxygen engines.
The habcraft is 8 meters in diameter and includes four complete habitation decks, for a total living area of 200 m2, allowing it to adequately house 24 people in space and on Mars. Expansion area is available in the fifth (uppermost) deck after the cargo it contains is unloaded upon arrival.
Fig. 2. An NTR augmented heavy lift launch vehicle, capable of transporting 24 colonists 1-way to the Red Planet.
Thus in a single booster launch, 24 people, complete with their housing and tools, can be transported one way from Earth to Mars. Now let us assume that starting in 2030 AD, an average of four such boosters are launched every year from Earth. If we then make various reasonable demographic assumptions, the population curve for Mars can be computed. The results are shown in fig. 3. Examining the graph, we see that with this level of effort (and the technology frozen at late 20th Century levels forever), the rate of human population growth of Mars in the 21st Century would be about 1/5th that experienced by colonial America in the 17th and 18th Centuries.

Space colonization is both beneficial and feasible—transportation won't be an obstacle
Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics, **1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

Fig. 3. Colonization of Mars compared to North America. Analysis assumes 100 immigrants/year starting in 2030, increasing at 2% annual rate, 50/50 male/female. All immigrants are between ages 20 and 40. Average of 3.5 children to an ideal Martian family. Mortality rates are 0.1% per year between ages 0 and 59, 1% between ages 60 and 79, 10% per year for those over 80.
This in itself is a very significant result. What it means is that the distance to Mars and the transportation challenge that it implies is not a major obstacle to the initiation of a human civilization on the Red Planet. Rather the key questions become those of resource utilization, growing food, building housing, and manufacturing all sorts of useful goods on the surface of Mars. Moreover the projected population growth rate, 1/5th that of Colonial America, while a bit slow, is significant on a historical scale, and assuming a cost of $1 billion per launch, the $4 billion per year program cost could be sustained for some time by any major power on Earth that cared to plant the seeds of its posterity on Mars.

Inter-Stellar travel will soon be possible – lightsails will make it feasible in 25 years
Zey in 2000
(Michael - Ph.D in sociology, executive director of the Expansionary Institute – "The Future Factor," p. 81)

<Homer Hickam has reason to be encouraged. According to scientists at NASA's Jet Propulsion Laboratory, we will someday find it relatively easy to visit the stars. They claim that we already possess the technology to develop interstellar launches that could travel one-third the speed of light or even faster. At this velocity, a craft could cover an incredible 2 trillion miles per year. Dan Goldin, NASA Administrator, thinks we will be able to launch interstellar missions in the next 25 years.
One type of craft that Hickam saw in NASA's computer is the lightsail. Forward Unlimited, a Clinton, Washington, company is working on such a concept, which they label the solar sail. Picture a craft, a rocket, surrounded by a huge sail, possibly 6–10 miles wide, yet only a few atoms thick. The craft is propelled by particles of light called photons that hit the solar sail and push the spacecraft forward at incredible speeds. Lasers that orbit the sun are transmitting the photons. These orbiting lasers, which draw their power from the sun itself, can continue to push the sail spacecraft forward at incredible speeds for months or even years over millions of miles. Theoretically, this laser-powered solar sail craft could travel at one-third the speed of light, making the trip to a star system 4.5 light-years from Earth in about 20 years. In that time, our craft would have traveled an almost inconceivable 20+ trillion miles. More astoundingly, these sun-orbiting lasers, generating power in the gigawatt range, would simultaneously perform other functions. The orbiting lasers will be removing Earth-orbiting space junk, providing energy for our planet, and maybe even destroying Earth-threatening comets and asteroids. According to Henry Harris, a JPL physicist, "The ultimate instrument for interstellar travel will not be merely for travel.">

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A2: Space Colonization Impossible

Space colonization is possible—Scientists only need inexpensive equipment to transport millions into orbit
Globus, Chairman of the National Space Society Space Settlement Advocacy Committee, September **2005** (Al, "Space Settlement Basics," September 22, http://www.nas.nasa.gov/About/Education/SpaceSettlement/Basics/wwwwh.html)

Who? You. Or at least people a lot like you. Space settlements will be a place for ordinary people. Presently, with few exceptions, only highly trained and carefully selected astronauts go to space. Space settlement needs inexpensive, safe launch systems to deliver thousands, perhaps millions, of people into orbit. If this seems unrealistic, note that a hundred and fifty years ago nobody had ever flown in an airplane, but today nearly 500 million people fly each year. Some special groups might find space settlement particularly attractive: The handicapped could keep a settlement at zero-g to make wheelchairs and walkers unnecessary. Some religious groups might prefer to live away from "non-believers". Penal colonies might be created in orbit as they should be fairly escape proof. People who wish to experiment with very different social and political forms could get away from restrictive social norms. Although some colonies may follow this model, it's reasonable to expect that the vast majority of space colonists will be ordinary people. Indeed, eventually most people in space settlements will be born there, and some day they may vastly exceed Earth's population. Based on the materials available, the human population in orbit could one day exceed ten trillion living in millions of space colonies with a combined living space hundreds of times the surface of the Earth.

Space colonization and travel are possible—we have the technology to make Mars habitable soon
Kluger, author and senior writer for Time Magazine, **2004** (Jeffrey, Time, "Mission To Mars," January 26, http://time-proxy.yaga.com/time/archive/printout/0,23657,993168,00.html)

The answer is to manufacture a lot of what you need on-site. If any of NASA's unmanned Mars ships do find accessible water on the planet, it will be very big news, and not merely because of what it means for the possibility of Martian life. Martian water, once purified, ought to be as useful for drinking and bathing as earthly water. What's more, since water is merely hydrogen and oxygen and since it's hydrogen that provides the propulsive fire in some liquid-fuel engines and oxygen that keeps those flames burning, breaking the two elements apart in a Mars-based fuel distillery could provide everything necessary to refill the tanks of a spacecraft once it arrives on the Red Planet. Oxygen produced on Mars could also be used as breathable atmosphere.
"One scenario," says John Hoffman, a physicist at the University of Texas at Dallas who is working on a 2007 Mars probe, "is to send rockets up two years before people go, then robotically make water for an 18-month stay and fuel for the return. Only when it's 100% done do you send humans." For mission planners--not to mention astronauts--spooked by the idea of arriving on Mars and finding that the fuel and water tanks have sprung a leak, redundant tanks could store twice as much as needed and provide some margin of safety.
If it's possible to make fuel, air and water on-site, it is also possible to grow food. Mars has plenty of soil, and if chemical samplers like those aboard Spirit prove that Mars dust isn't poisonous, it would be a relatively straightforward job to assemble a greenhouse-like enclosure, raise the temperature, pump up the atmosphere and plant a few seeds. Donald Henninger, a NASA chief scientist, has identified 13 crops that could thrive in a space habitat, including wheat, potatoes, soybeans and salad greens. "You can take stored food along, but how long does it last?" he asks.
Molecular biologist Rob Ferl at the University of Florida wants to conduct similar experiments with mustard seeds. "The first generation of experiments would be enclosed in something like the rover," he says. "You'd use a mechanical arm to scoop up dirt and capture sunlight with light tubes."
The fact that some of these early experiments could take place with existing technology on future rovers is one reason mission advocates question Bush's long time frame for his Mars flights. "Johnson Space Center was a cow pasture when we started the lunar program," says Humboldt Mandell, a planetary scientist at the University of Texas who managed the last Mars initiative, "and still we got to the moon in seven years from a cold start."

Feasibility arguments of space colonization are flawed—They misevaluate the economics of settlement – colonization of North America proves
Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics, **1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

A frequent objection raised against scenarios for the human settlement and terraforming of Mars is that while such projects may be technologically feasible, there is no possible way that they can be paid for. On the surface, the arguments given supporting this position appear to many to be cogent, in that Mars is distant, difficult to access, possesses a hostile environment and has no apparent resources of economic value to export. These arguments appear to be ironclad, yet it must be pointed out that they were also presented in the past as convincing reasons for the utter impracticality of the European settlement of North America and Australia. It is certainly true that the technological and economic problems facing Mars colonization in the 21st century are vastly different in detail than those that had to be overcome in the colonization of the New World in the 17th century, or Australia in the 19th century. Nevertheless, it is my contention that the argument against the feasibility of Mars colonization is flawed by essentially the same false logic and lack of understanding of real economics that resulted in repeated absurd misevaluations of the value of colonial settlements (as opposed to trading posts, plantations, and other extractive activities) on the part of numerous European government ministries during the 400 years following Columbus.
During the period of their global ascendancy, the Spanish ignored North America; to them it was nothing but a vast amount of worthless wilderness. In 1781, while Cornwallis was being blockaded into submission at Yorktown, the British deployed their fleet into the Caribbean to seize a few high-income sugar plantation islands from the French. In 1802, Napoleon Bonaparte sold a third of what is now the United States for 2 million dollars. In 1867 the Czar sold off Alaska for a similar pittance. The existence of Australia was known to Europe for two hundred years before the first colony arrived, and no European power even bothered to claim the continent until 1830. These pieces of short-sighted statecraft, almost incomprehensible in their stupidity, are legendary today. Yet their consistency shows a persistent blind spot among policy making groups as to the true sources of wealth and power. I believe that it is certain that two hundred years from now, the current apathy of governments towards the value of extraterrestrial bodies, and Mars in particular, will be viewed in a similar light.

A2: No Planets For Colonization – Genetic Engineering Solves

Space colonization is possible through methods like terraforming and genetic engineering
Ust, author and writer for The Thought, **2001** (Daniel, "For a Free Frontier: The Case for Space Colonization," http://mars.superlink.net/~neptune/SpaceCol.html)

Another solution is to make the worlds suitable for human life. This is dubbed "terraforming," although this connotes turning a planet into something similar to Earth. For our purposes, one suitable for humans could be radically different from Earth. There are at least two candidates for terraforming in our solar system, Mars and Venus. Terraforming strategies vary. One notion is the slow seeding of the target planet with tailored organisms to make it more and more earthlike. This can take a long time – perhaps thousands of years. Another proposal suggests using "fast and dirty" techniques such as crashing comets or forcing volcanic eruptions with nuclear bombs on Mars to make its atmosphere thicker.
The posthuman alternative is to redesign humans, either through genetic engineering or by a machine-like fix such as artificial lungs that can process Martian air. [See my What is posthumanism?.] This demands technology of a higher order than today. The advantage here is that one can take planets as they are. The disadvantage is the need for the high tech base. Some might believe that this high tech base can only be brought about by large scale government funding or corporate investment. However, as the technology becomes more readily available, e.g., home genetics labs, cheaper and better prosthetics and wider human/machine interfaces, the potential for grassroots posthumanism also increases. Another disadvantage is that people altered to live in an environment might not be able to live in others. However, this is not a serious problem. Any technology capable of altering people to this degree will most probably be capable of altering them further. We can easily imagine someone adapted to a Martian habitat later being adapted to suit a Titanian (after Saturn's big moon) one and so on. Also, current environment suits, such as space suits, scuba gear and fire fighting equipment, allow people to live in hostile surroundings. There's good reason to think people adapted, say, to live on Mars, could use such things to get by in other environments.

A2: No Planets For Colonization – Lobster Men Solve

Space stations and lobster-men prove that colonization is possible with current technology and proposals
Ust, author and writer for The Thought**, 2001** (Daniel, "For a Free Frontier: The Case for Space Colonization," http://mars.superlink.net/~neptune/SpaceCol.html)

Next, there's O'Neill-style colonization. (Named after G. K. O'Neill, author of The High Frontier, a book on space colonization. See also Colonies in Space by T. A. Heppenheimer.) Why live on planets when they limit movement and environmental options? Why not instead build large space stations the size of conventional cities or bigger where one can live in an environment similar to Earth yet have easy access to all the advantages of space? O'Neill-style colonies would be just that – large cities in space. There are many different types of these colonies on the drawing board, but they all have immense size and internally earthlike conditions in common. All of them seek to simulate Earth by being large enough to house farms, parks and communities with lots of open air. They also rotate to simulate gravity. Third, there's small station colonization. This differs from O'Neill-style colonization in that it does not rely on huge behemoths to house people. Instead, smaller "ranch-sized" space stations could be built, each housing perhaps a family or a small village. This approach is similar to several successful colonizations on Earth from Polynesia to Plymouth.
This brings us to Lobster-style colonization, so named for Bruce Sterling's short story "Cicada-Queen" (in The Crystal Express). This is another kind of posthumanism. Instead of living in a space station, whether large or small, the individual is redesigned to live in space by a melding of space suit and organism or, in another scenario, to live in space without a space suit. This demands a higher level of technology, but the roots of it can be seen in our present technology. When will it be done? This is hard to say. Looking at technological limits can give us a clue. With current technology, small station colonization is possible. Already several space stations have been built and operated, e.g., the US SKYLAB and the Soviets' MIRs. They were intended for research, not colonization, but they show small scale space colonies are within our grasp.

A2: No Planets For Colonization – Terraforming Solves

Terraforming allows for space colonization—Extremophilic organisms would make Martian land habitable
Slotnick, Contributing Editor of The American Scientist, **2000** (Rebecca Sloan, The American Scientist, "Extremophilic Terraforming," March/April, http://www.americanscientist.org/template/AssetDetail/assetid/14719)

You'd think it would take a pretty big toolkit to prepare the Martian surface for human life. Not necessarily, at least at the level of a human habitat, according to Robert Richmond of NASA's Marshall Space Flight Center. In fact, the components may prove to be surprisingly, even microscopically, small in size. And although it is perhaps still too early for would-be planetary travelers to begin packing, the notion of terraforming Mars--altering its environment to allow for human habitation--is one that, for many scientists, has recently evolved from pure science fiction to theoretical possibility. One significant reason for the surge in optimism is a series of discoveries suggesting that extremophilic organisms--those that thrive under extreme environmental conditions--may be uniquely equipped to serve as vectors of change on Mars's inhospitable surface. Among the most promising of those organisms is the bacterium Deinococcus radiodurans, which has been found in many types of soil and such unappealing spots as sewage systems and animal fecal material. Richmond, a radiation biologist at the Space Flight Center, along with Michael Daly of the Uniformed Services University of the Health Sciences and Rajagopalan Sridhar of Howard University Medical Center, has been testing the limits of D. radiodurans in the hopes of harnessing its unusual characteristics for just such a toolkit (Proceedings, International Society for Optical Engineering, v. 3755, pp. 210-222.) It is widely accepted that current planetary conditions on the immediate surface of Mars eliminate the possibility of sustaining life as we know it: Low atmospheric pressure and surface temperature combined with relatively high levels of ultraviolet and ionizing radiation would appear effectively to prevent the long-term survival of organic life. In the 1970s, the Viking missions established that Martian soil contains high levels of certain metals and oxidizing species. To survive such a noxious environment, an organism must be highly resistant to oxidizing conditions.
Hence the excitement over D. radiodurans. Not only can this bug withstand extreme amounts of radiation (whence it receives its name), but it has proved quite resistant to the effects of peroxides and other oxidizers as well. And when subjected to desiccation, freeze-drying and exposure to solar-flux ultraviolet radiation, the organism fares extremely well. Its multiple resistances have led Richmond and his colleagues to term the bacterium a "polyextremophile." Although scientists have documented the existence of extremophiles living in isolated environments like deep-sea hot vents or hotsprings for decades, rarely, if ever, has an organism been found to withstand such a wide array of extreme conditions. What makes the research so thrilling, says Richmond, is the "chance to actually uncover the utilities of the bacterium and not just isolate and classify it." Those possible utilities have increased dramatically in number since the successful sequencing of the bacterium's genome in November 1999. Sequencing the DNA revealed that many copies of the genome are present in any given bacterial cell in register--all the bases making up the DNA sequence are lined up in the same way, and the sequence itself is full of repetitions. It has since been proposed by Daly and coworkers that D. radiodurans's durability is the product of an efficient and highly accurate repair system: If exposure to radiation damages one strand of DNA, another strand may serve as a template. This hypothesis provides an explanation for each of the microbe's resistances. Thanks to its efficient repair system, D. radiodurans can survive any number of extreme environments.
With a more thorough understanding of what causes D. radiodurans's multiple durabilities, scientists such as Daly are now working to genetically engineer the bacterium to perform work that people cannot. After all, Richmond says, "you must always think of the organism's utility in managing a habitat--you have to put the bug to work for you." Because it could successfully withstand the high levels of oxidants found on the Martian surface, D. radiodurans might be engineered to detoxify the soil. In Daly's lab, for example, he and his colleagues insert genes that code for an enzyme capable of oxidizing organic toluene, thereby rendering this toxic component of organic solvents harmless to humans. It may be possible to engineer a bug capable of reducing iron or manganese ions to their elemental forms, thus reducing the concentrations of noxious substances, and advancing one step closer to the creation of a habitable space.In fact, NASA is considering launching probes to specific Martian sites. This allows consideration of the use of extremophile organisms such as D. radiodurans to begin microterraforming small surface areas. The bacteria could begin transforming the harsh and uninhabitable Martian terrain in such a future scenario into one capable of sustaining human life. At its most fantastic, terraforming involves the alteration of an entire planet's environment, but, realistically speaking, says Richmond, we can perhaps imagine modifying the oxygen and soil content of a small room, several cubic meters in area, in direct contact with the habitat.

Space colonization is possible through terraforming—greenhouse gases would be introduced to thicken Mars' atmosphere for habitation
Hurtak, Researcher at the Academy for Future Science, **2003** (D.M., "The Quest to Terraform Mars," http://www.affs.org/html/the_quest_to_terraform_mars.html)

While the atmosphere of Mars closely resembles that of primitive Earth, scientists have confirmed that Mars today has water, carbon, oxygen, and nitrogen. More significantly for its temperature, Mars has an atmospheric pressure that is only 1% that of Earth's. For water to have flowed upon the Martian surface its atmosphere would have to have been thicker than it is today.
A primary factor in determining whether a planet like Mars can be terraformed is to determine if there exist (or could be introduced) sufficient greenhouse gases such as CO2 to create an atmosphere that would warm the planet at least to the point above freezing. Most scientists believe that there is a sufficient amount of CO2 on Mars, in its polar caps and in its surface soils (the regolith), to begin the terraforming process. Two proponents of terraforming, Robert Zubrin (formerly a staff engineer at Lockheed Martin Astronautics in Denver, now president of his own company, Pioneer Astronautics) and Chris McKay (of NASA Ames Research Center), calculate that even a 4°C (7°F) rise in surface temperature on Mars would be sufficient to initiate a process that would eventually produce the overall necessary increase of 55°C (100°F) (current temperature on Mars is an average -60°C or -76°F), bringing the average surface temperature above the freezing point, permitting water to exist once again in liquid form on the surface, and transforming a thin atmosphere of 6-10mb into one in the hundreds of mbars.4
Zubrin and McKay believe the place to start is with the placement of orbital solar reflective mirrors on Solar Power Satellites (SPS) that would circle the Martian poles and focus sufficient heat from the sun to begin warming the caps and releasing CO2 into the atmosphere.5 This process would not destroy the polar caps but would melt a controlled amount, sufficient to start the thickening of

the Martian atmosphere and global warming. Zubrin and McKay have also calculated that a temperature rise of 10°C (18°F) could further release significant amounts of CO_2 from the Martian regolith (surface soils) and increase atmospheric pressure by as much as 200-300 mbs.

A2: No Planets For Colonization – Terraforming Solves

Introduction of bacteria and plants through terraforming would make Mars habitable for colonization
Hurtak, Researcher at the Academy for Future Science, **2003** (D.M., "The Quest to Terraform Mars," http://www.affs.org/html/the_quest_to_terraform_mars.html)

Another means under discussion to introduce greenhouse gases is the establishing of factories on Mars that would principally produce greenhouses gases (CFCs) through the electrolytic and chemical methods which have contributed to "global warming" on Earth. Once Mars could support even the smallest forms of life, we would artificially follow the course that earth has taken, that is, introduce primitive bacteria that produce not only carbon, but methane and ammonia—strong greenhouse gases which could later be removed from the atmosphere when the planet had warmed sufficiently.
Although Zubrin and McKay estimate that Mars would only reach an atmospheric pressure close to that of Earth's in 1,500 to 2,500 years, this is not an outlandish time frame. Man could live and work on the planet during the process of terraforming. In fact, with the proper implementation of all four factors—mirrors, drilling, factory-produced gases (CFCs), and bacteria—it could conceivably take less than 500 years for humans to be able to walk on Mars without a space suit, wearing only a small "scuba-type" breathing apparatus around their mouths.
Once the Martian atmosphere has thickened and temperatures have risen above freezing, the final stage of terraforming can begin. At that time, in addition to bacteria, primitive plants are to be introduced to aid in transforming the abundant carbon dioxide in the atmosphere into the oxygen necessary for more advanced forms of terrestrial life. This process could take over 100 ,000 years, with established organisms slowly removing CO_2 from the atmosphere through the photosynthetic use of sunlight. Sufficient greenhouse gases would have to be present to contain the heat generated during this process and prevent the planet from cooling once again. Gradually, the oxygen content would reach a level where humans could breathe, a process that occurred on Earth several billion years ago. More advanced plants could not be introduced until the atmosphere contained enough oxygen and nitrogen for their survival. Terraforming is not an impossibility; humans begin the process and nature completes the majority of the work. Terraforming only becomes a doubtful possibility if Mars lacks sufficient reserves of CO_2, water and nitrogen, elements which are essential for life as we know it. But Mars seems to have an abundance of these important elements and, as McKay sees it, terraforming would help Mars revert to an earlier state when microbial life flourished, as evidenced in the Mars meteorite. Of course, if life currently exists on Mars in any form, no matter how small, we would not want to disturb its evolutionary process and must keep a "hands off" approach. However, if no life currently exists there, why not make it a better place—not only for human generations to come, but for all the other exobiological expressions of life in the universe that may surprise us with a new definition of life.

Humans can colonize space—Planetary warming would release gases to make Mars livable for humans
Haynes, Distinguished Research Professor of Biology, York University**, 1993** (Robert H., "How might Mars become a home for humans?" http://www.users.globalnet.co.uk/~mfogg/haynes.htm)

On other planets, high and low extremes of atmospheric temperatures and pressures, lack of free oxygen and liquid water, high concentrations of toxic gases, and deadly radiation levels variously preclude the existence of life. Though presently barren, Mars, nonetheless, is a biocompatible planet. Its unalterable physical characteristics (e.g. size, density, gravity, orbit, rotation rate, incident sunlight) and its possible chemical resources are remarkably consistent with life. Indeed, it was the hope that organisms might be found on Mars that made life-detection the top priority for NASA's Viking missions in 1976. However, all of the ingenious biological experiments carried out by the two robotic landers gave negative results. The Viking data did reveal that environmental conditions on Mars are more severe than ever had been imagined. At the two 'temperate zone' landing sites, local temperatures exhibited wide daily variation averaging 60 degrees below zero celsius. The atmospheric pressure was found to be very low, just over six millibars, which is less than one hundredth of that at Earth's surface. This thin atmosphere consists of 95% carbon dioxide and 3% nitrogen, with only trace amounts of water vapour, oxygen and other gases. There is no protective ozone layer to shield the planet from the ultraviolet radiation emitted by the sun. Most surprising was the absence from the soil of any detectable organic molecules, the building blocks of life. Even though such materials arrive on Mars in meteorites, they are subsequently destroyed, at least on the surface of the planet. Thus, any organisms which might arrive there unprotected today would be freeze-dried, chemically degraded, and soon reduced to dust. It would not be possible to 'seed' Mars just by sprinkling bacteria over its surface.
Despite its presently hostile environment, Mars did once possess a great northern ocean and substantial quantities of flowing water, together with a thick, mostly carbon dioxide, atmosphere. These conditions may have persisted long enough for early stages of chemical and cellular evolution to have occurred. It is largely for these reasons that some scientists have begun to consider whether Mars might ultimately be returned, by human intervention, to a habitable state. A major uncertainty in these discussions is whether there remains on Mars today adequate amounts of carbon dioxide, water and nitrogen to allow such a planetary-scale transformation. If most of Mars' original endowment of these materials has been lost to space, then the regeneration of a habitable state would be impossible. Preliminary studies have shown that if the surface crust and polar caps of Mars still possess sufficient and accessible quantities of carbon dioxide, water and nitrogen, and if acceptable planetary engineering techniques can be devised to initiate planetary warming and release these volatile materials from their geological reservoirs, then Mars could support a stable and much thicker carbon dioxide/nitrogen atmosphere than it does at present. This atmosphere would be warm and moist, and water would flow again in the dried up river beds. The average temperature at the surface would rise to about 15 degrees celsius and the atmospheric pressure would be roughly twice that on Earth. Appropriately selected, or genetically engineered, anaerobic microorganisms, and eventually some plants, could grow under these conditions. If future exploration reveals that the necessary volatiles are indeed available then a new home for life might someday be created on our sister planet.

A2: No Planets For Colonization – Terraforming Solves

Terraforming is possible with current technology—nuclear detonations could spread dust to induce atmosphere warming and release of water
Cochrane, writer for Red Colony Online, **2001** (Kian, "Kian Cochrane's Terraforming Method," February 22, http://www.redcolony.com/art.php?id=0102220)

Terraforming, being a sci-fi concept, has hundreds of approaches. Some are feasible, while others are pure fantasy. Which methods will be used will depend on the money available and how quickly the people want it completed.
There are a myriad of ways to heat Mars so that liquid water can exist on its surface. Most methods raise the polar temperature by 4 K to sublime the southern ice cap, releasing around 50-100 mb of carbon dioxide into the atmosphere. This would raise the mean temperature by 10 K, which would start to release more carbon dioxide trapped in the regolith. As more carbon dioxide is released, more heat is trapped by it, which causes more carbon dioxide to be released. This process is called positive-feedback greenhousing. For liquid water to exist at least in the equatorial regions, around 600 mb of carbon dioxide needs to be evaporated. It is not known exactly how much carbon dioxide exists on Mars, but estimates range from 100-2000 mb.
The southern ice cap, being white, reflects much of the sun's energy. If dark-colored dust were spread over the cap, more of the sun's energy would be trapped, allowing the cap to sublime and start the positive feedback process. One way to spread the cap with dust is to detonate 20-KT nuclear weapons, underground, in a dust drift located near the south pole. The amount of dust created in the nuclear detonation would be enough to cover the whole cap, subliming it. The ideal detonation time would be during the commencement of spring in the southern hemisphere of Mars. A new bomb will need to be detonated every year at the beginning of spring until all of the cap has sublimed, which is estimated to be four martian years (7 earth years). This is by far the cheapest, easiest, fastest, most automatic and most feasible method. We could start this today if we wanted to. However, the social, international hatred of nuclear devices will probably prevent this method from being used.

Release of greenhouse gases like PFCs make terraforming possible
Cochrane, writer for Red Colony Online, **2001** (Kian, "Kian Cochrane's Terraforming Method," February 22, http://www.redcolony.com/art.php?id=0102220)

A class of primitive bacteria called Methanogens can survive on today's Mars, and would create methane, a greenhouse gas, from carbon dioxide and hydrogen contained in the regolith. This method is also very cheap, easy, and automatic, but it is not very feasible, as the methane would last mere hours before being broken up by the sun's powerful UV rays.
Perfluorocarbons are very powerful, long-lived greenhouse gases. Fluoroform (CF4) is an example. Fluroform is 10,000 times more effective a greenhouse gas than carbon dioxide, and lasts centuries even in Mars's tenuous atmosphere. It is made by releasing pure fluorine into the Martian atmosphere. The fluorine reacts with carbon dioxide to form fluoroform and oxygen. Automatic factories could be inserted on the martian surface that would mine apatite for fluorine, using solar power. The main advantage of using PFC's is that it is the most feasible method that is socially acceptable. It is also very flexible; time needed is directly proportional to cost.

Humans can terraform Mars using a space mirror to meld ice caps
Cochrane, writer for Red Colony Online, **2001** (Kian, "Kian Cochrane's Terraforming Method," February 22, http://www.redcolony.com/art.php?id=0102220)

A soletta is a fancy name for an orbiting space mirror. To be able to sublime the southern cap, the soletta would need to be about 130 km in diameter, and would weigh around 200,000 tons. Such a mirror would be too big to launch directly from Earth, but could be contructed in space using materials from asteroids. The mirror would be placed 214,000 km behind Mars, allowing it to hover as a statite; the light pressure hitting it balances the gravity pulling it in. Solettas have the added advantage of flexibility; solettas can also melt permafrost and release volatiles contained in the regolith. However, the construction of a space mirror would be a overly grandose project, taking several years and costing billions of dollars.

A2: No Planets For Colonization – Terraforming Solves

Release of PFCs will melt ice caps to make Mars habitable—this terraforming process would be completed quickly
Cochrane, writer for Red Colony Online, **2001** (Kian, “Kian Cochrane’s Terraforming Method,” February 22, http://www.redcolony.com/art.php?id=0102220)

If regolithal carbon dioxide reserves prove to be too small, then more heating will be required. PFC production would be the only effective method in this case. Heating beyond the 4 K needed to sublime the southern cap is recommended anyway, as added heat will melt the northern ice cap, a vast source of water. Now that Mars has a thick atmosphere of carbon dioxide and a much warmer climate, only water and nitrogen will need to be added for plants to thrive on Mars. Waiting for the permafrost to melt would take centuries. Melting the northern ice cap, which is water ice, would be much quicker. Nitrogen is thought to exist as nitrates in the regolith. However, this has not been proven. The easiest way to melt the northern cap is to pump enough PFC's into the atmosphere so that the average temperatures of the polar regions rise above freezing. This would make the tropics uncomfortably warm, however. Using PFC's is much cheaper and easier than using solettas, however. Solettas, described in the previous section, could also be utilized to melt the ice cap. This will probably be used in conjunction with PFC's. Solettas could also be used to release nitrogen from nitrates in the soil.
Nanotechnology could also be used to melt ice and release nitrogen. Self-replicating "nanites" would be smaller than a bacterium, yet they are able to work very quickly, allowing total terraformation in a matter of decades. Nanotechnology, however, is an invention of the future. Asteroidal impacts could also release nitrogen and/or water, but this would be a waste of the asteroid's energy, and this would leave huge craters, and fill the atmosphere with dust. Although a carbon dioxide atmosphere would be fine for plants, animal life requires an oxygen-containing atmosphere. Plants take in carbon dioxide, and release sugar and oxygen. This will be the predominant oxygenation method, but will probably take longer than a century. Black chlorophyll would shorten the time needed considerably. The Bosch process could supplement plants in oxygenation. In this process, carbon dioxide and hydrogen combine to form water and carbon. The water is electrolyzed to form hydrogen and oxygen. The oxygen is pumped into the atmosphere, while the hydrogen is put back into the process. Power for this process will need to come from wind or nuclear power, as solar power would be better utilized by plants.The terraformation process could take as little as twenty years or as much as 100,000 years. My opinion is that it will take around sixty years. However, considering it took billions of years for the same processes to occur on earth, total terraformation will be a quick process, no matter how it is reached.

Terraforming would make Mars habitable—allows dormant life to revive through global warming
UPI 2005
(“Greenhouse gases could ‘terraform’ Mars,” February 3, p.lexis)

NASA scientists said it might be possible to create global warming on Mars, which would melt the polar ice caps and create conditions suitable for life. Scientists at the agency's Ames Research Center said releasing fluorine-based synthetic greenhouse gases into the Martian atmosphere could raise the planet's temperature enough to melt the ice caps. In fact, they said, introducing global warming on the red planet could be the best way to turn its frozen landscape into a habitable world in the future.
Explorations of Mars over the past year by NASA's twin robotic rovers, Spirit and Opportunity, have shown it once was warm enough for liquid water to flow across its surface. It is possible the water created conditions that allowed living organisms to emerge. Though Mars is much colder now, perhaps those organisms still exist beneath the planet's surface and could be encouraged to flourish once again in warmer temperatures. "Bringing life to Mars and studying its growth would contribute to our understanding of evolution, and the ability of life to adapt and proliferate on other worlds," said Margarita Marinova, one of the Ames team. "Since warming Mars effectively reverts it to its past, more habitable state, this would give any possibly dormant life on Mars the chance to be revived and develop further."

Space power reactors, terraforming, and closed loop environments make space colonization possible
Young, former astronaut and associate technical director of NASA Johnson Space Center, **2003** (John W., “The BIG Picture: Ways to Mitigate or Prevent Very Bad Planet Earth Events,” http://space.balettie.com/Young.html)

What Are We Doing? We know that to live and work on the Moon or Mars, we will require the following:
Reliable, Uninterruptable Power: We can readily achieve this with the Space Power Reactor which for 5 Curries of launch radiation will supply 750 kWh reliably on the Moon or Mars. Why does not the United States require that our electric power to be reliable and uninterruptible as a matter of national security and national survival? Lives are lost every year when electric power fails. On a high priority, Space Power Reactor development must be supported and accelerated with upgraded power capabilities.
Terraforming: To survive on the Moon and Mars we must grow our own food in totally closed-loop systems. We continue to demonstrate how to do this. A National Geographic article recently reported that 80 bushels of wheat an acre is a great crop. Under IR light emitting diodes to avoid heat, our wheat produces 600 bushels an acre in 75 days. And, Dr. Bugbee has proposed a new higher production wheat with shorter growing times. Our engineering development demonstrations of our Terraforming ability should be supported and accelerated on a high priority basis.
Closed Loop Environments: Humans on other places in the solar system will recycle everything they eat, drink and breathe. The recent 90-day tests at JSC and the future Bioplex are demonstrating these capabilities. These closed-loop systems will be controlled by sophisticated computer software with provisions for manual maintenance and repair. The Bioplex facility should be accelerated on a high priority basis.

didn’t think we had cards on that did you?

A2: No Planets For Colonization – Terraforming Solves

Terraforming and environmental development makes space colonization feasible
Space Online 2002 (Leonard David, Space writer, "The Moon Or Mars: Which Shall It Be?" January 28, http://www.space.com/news/moon_or_mars_020128-1.html)

While the land of Oz had its "lions, tigers, and bears," Mars has algae, mosses, and lichen. Those are early ingredients for the transformation of Mars said James Graham, a scientist in the Department of Botany and Center for Limnology at the University of Wisconsin-Madison. Over the decades, Mars has been viewed as a potential global engineering project. Numbers of scientists have speculated on how best to reset the climate clock on Mars back to an earlier time. Doing so is called "terraforming" -- the ability to transform the dry and cold Mars we know today into one that is more Earth-like. For example, spreading dark substances over Mars' polar caps, thereby inducing them to melt and thicken the atmosphere was one idea, Graham said. Another proposal was to orbit the planet with giant reflecting mirrors. These huge reflectors would focus additional sunlight onto the Martian surface and ostensibly raise the planet's temperature. More recently, and arguably more reasonable research, suggests that the manufacture and release of greenhouse gases on Mars could be used to drive the globe's climate to a warmer stable state.
Mars makeover Looking into the future, Graham said he assumes an opening chapter of planetary engineering will be giving Mars a denser atmosphere. That condition is one in which liquid water is stable, and a higher average surface temperature is present on the planet. Given those conditions, Graham said, there are Earth organisms that might one day be transplanted to Mars to effect the early stages of the biological terraforming of the Red Planet. There are two start-up stages, Graham outlined, in giving Mars a makeover. First, the microbial stage where a variety of photosynthetic microbes, including algae and cyanobacteria would establish a self-sustaining biosphere and begin the transformation of the Martian regolith and atmosphere. Fast growing green algae, like that found in the Antarctic, Graham reported, are able to survive repeated freezing and thawing - of considerable value in an early terraformed Mars environment. Another class of algae, Micrasterias denticulata, which grows in ponds within the alpine moorlands, has been shown to have a high resistance to strong radiation, he said. Cyanobacteria are widespread members of lakes, streams, and soils, and also commune in Antarctica, especially in the Dry Valleys region. Using "screening pigments and quenching agents," cyanobacteria fend off ultraviolet radiation, and are known to have mechanisms for repair of damage to their DNA. These attributes and others make them good candidates for the terraforming of Mars, Graham said.
Repeat roll Following the transformations effected by the microbial stage, Graham said he terms the next step as the "bryophyte stage" of terraforming. Bryophytes are extremely important in terrestrial polar and alpine ecosystems where the severe climate prohibits flowering plants. "More than 460 million years ago, bryophytes once had a significant part in terraforming Earth. Perhaps at some point in the future, they will repeat their role on Mars," Graham noted. In a second stage, mosses and lichens would be introduced on Mars. They would fix atmospheric carbon dioxide into degradation-resistant organic compounds and transform the atmosphere into one with appreciable amounts of oxygen. This action, in turn, opens the way for flowering plants and eventually agriculture on the surface of Mars, Graham said."Lichens are important as Martian colonists. They are a pioneer species that can break down rocks, helping to form mineral soils and create conditions permitting other plants to be introduced to Mars," Graham emphasized. Mosses, too, will likely play an important role in terraforming by sequestering large amounts of carbon dioxide in the form of decay-resistant organic compounds in future Martian peatlands, he added.

A2: Other Planets Have No Resources For Colonists

Mars colonization is possible—the planet has the proper raw materials to sustain human life
Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics, **1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

Among extraterrestrial bodies in our solar system, Mars is unique in that it possesses all the raw materials required to support not only life, but a new branch of human civilization. This uniqueness is illustrated most clearly if we contrast Mars with the Earth's Moon, the most frequently cited alternative location for extraterrestrial human colonization. In contrast to the Moon, Mars is rich in carbon, nitrogen, hydrogen and oxygen, all in biologically readily accessible forms such as CO_2 gas, nitrogen gas, and water ice and permafrost. Carbon, nitrogen, and hydrogen are only present on the Moon in parts per million quantities, much like gold in sea water. Oxygen is abundant on the Moon, but only in tightly bound oxides such as SiO_2, Fe_2O_3, MgO, and Al_2O_3, which require very high energy processes to reduce. Current knowledge indicates that if Mars were smooth and all it's ice and permafrost melted into liquid water, the entire planet would be covered with an ocean over 100 meters deep. This contrasts strongly with the Moon, which is so dry that if concrete were found there, Lunar colonists would mine it to get the water out. Thus, if plants were grown in greenhouses on the Moon (a very difficult proposition, as we shall see) most of their biomass material would have to be imported. The Moon is also deficient in about half the metals (for example copper) of interest to industrial society, as well as many other elements of interest such as sulfur and phosphorus. Mars has every required element in abundance. Moreover, on Mars, as on Earth, hydrologic and volcanic processes have occurred, which is likely to have concentrated various elements into local concentrations of high-grade mineral ore. Indeed, the geologic history of Mars has been compared with that of Africa7, with very optimistic inferences as to its mineral wealth implied as a corollary. In contrast, the Moon has had virtually no history of water or volcanic action, with the result that it is basically composed of trash rocks with very little differentiation into ores that represent useful concentrations of anything interesting.
But the biggest problem with the Moon, as with all other airless planetary bodies and proposed artificial free-space colonies (such as those proposed by Gerard O'Neill8) is that sunlight is not available in a form useful for growing crops. This is an extremely important point and it is not well understood. Plants require an enormous amount of energy for their growth, and it can only come from sunlight. For example a single square kilometer of cropland on Earth is illuminated with about 1000 MW of sunlight at noon; a power load equal to an American city of 1 million people. Put another way, the amount of power required to generate the sunlight falling on the tiny country of El Salvador exceeds the combined capacity of every power plant on Earth. Plants can stand a drop of perhaps a factor of 5 in their light intake compared to terrestrial norms and still grow, but the fact remains; the energetics of plant growth make it inconceivable to raise crops on any kind of meaningful scale with artificially generated light. That said, the problem with using the natural sunlight available on the Moon or in space is that it is unshielded by any atmosphere. (The Moon has an additional problem with its 28 day light/dark cycle, which is also unacceptable to plants). Thus plants grown in a thin walled greenhouse on the surface of the Moon or an asteroid would be killed by solar flares. In order to grow plants safely in such an environment, the walls of the greenhouse would have to be made of glass 10 cm thick, a construction requirement that would make the development of significant agricultural areas prohibitively expensive. Use of reflectors and other light-channeling devices would not solve this problem, as the reflector areas would have to be enormous, essentially equal in area to the crop domains, creating preposterous engineering problems if any significant acreage is to be illuminated. Mars, on the other hand, has an atmosphere of sufficient density to protect crops grown on the surface against solar flares. On Mars, even during the base building phase, large inflatable greenhouses made of transparent plastic protected by thin hard-plastic ultra-violet and abrasion resistant geodesic domes could be readily deployed, rapidly creating large domains for crop growth. Even without the problems of solar flares and a month-long diurnal cycle, such simple greenhouses would be impractical on the Moon as they would create unbearably high temperatures. On Mars, in contrast, the strong greenhouse effect created by such domes would be precisely what is necessary to produce a temperate climate inside. Even during the base building phase, domes of this type up to 50 meters in diameter could be deployed on Mars that could contain the 5 psi atmosphere necessary to support humans. If made of high strength plastics such as Kevlar, such a dome could have a safety factor of 4 against burst and weigh only about 4 tonnes, with another 4 tonnes required for its unpressurized Plexiglas shield. In the early years of settlement, such domes could be imported pre-fabricated from Earth. Later on they could be manufactured on Mars, along with larger domes (with the mass of the pressurized dome increasing as the cube of its radius, and the mass of the unpressurized shield dome increasing as the square of the radius: 100 meter domes would mass 32 tonnes and need a 16 tonne Plexiglas shield, etc.). Networks of such 50 to 100 meter domes could rapidly be manufactured and deployed, opening up large areas of the surface to both shirtsleeve human habitation and agriculture. If agriculture only areas are desired, the domes could be made much bigger, as plants do not require more than about 1 psi atmospheric pressure. Once Mars has been partially terraformed however, with the creation of a thicker CO_2 atmosphere via regolith outgassing, the habitation domes could be made virtually to any size, as they would not have to sustain a pressure differential between their interior and exterior. The point, however, is that in contrast to colonists on any other known extraterrestrial body, Martian colonists will be able to live on the surface, not in tunnels, and move about freely and grow crops in the light of day. Mars is a place where humans can live and multiply to large numbers, supporting themselves with products of every description made out of indigenous materials. Mars is thus a place where an actual civilization, not just a mining or scientific outpost, can be developed. And significantly for interplanetary commerce, Mars and Earth are the only two locations in the solar system where humans will be able to grow crops for export.

Moon colonization is possible—it's close to earth and rich with resources that can sustain life
Space Online 2002 (Leonard David, Space writer, "The Moon Or Mars: Which Shall It Be?" January 28, http://www.space.com/news/moon_or_mars_020128-1.html)

For Paul Spudis, a geologist at the Lunar and Planetary Institute (LPI) in Houston, Texas, the Earth's Moon is the ideal setting for the first colony. Making the case for the Moon's value is topped by its closeness to Earth. Being just three days away, as the rocket flies, it's an easily accessible location. Alien, yet familiar thanks to Apollo moonwalkers and robotic probes, the Moon is resource-rich terrain, Spudis said."My contention is that you can go anywhere on the Moon and make what you need to survive," Spudis remarked. What good is the Moon? It is a natural laboratory for planetary science, a place to observe the Universe, a source of materials and energy, and a place to learn to live and work in space, he suggested."An aspect of going to the Moon first is learning how to explore," Spudis said. "We can learn how to explore a planet on the Moon. It's a simple fact. We don't know what the best, optimal mix of people and machines are to explore a planet. How do machines and humans act synergistically?" he posed.Another reason to colonize the Moon next, Spudis argued, is to ameliorate risk of future planetary missions by re-acquiring NASA's experience base through lunar missions.

A2: Space ➔ Bone/Muscle Loss

Space settlements in orbit prevent muscle and bone degradation through creation of pseudo-gravity environments
Globus, Chairman of the National Space Society Space Settlement Advocacy Committee, September **2005** (Al, "Space Settlement Basics," September 22, http://www.nas.nasa.gov/About/Education/SpaceSettlement/Basics/wwwwh.html)

<In orbit, not on a planet or moon. Why should we live in orbit rather than on a planet or moon? Because orbit is far superior to the Moon and Mars for colonization, and other planets and moons are too hot, too far away, and/or have no solid surface.
For an alternate view, see Robert Zubrin's powerful case for Mars exploration and colonization. Mars' biggest advantage is that all the materials necessary for life may be found on Mars. While materials for orbital colonies must be imported from the Moon or Near Earth Objects (NEO's -- asteroids and comets), there are many advantages to orbital colonies. Advantages include:
Earth-normal 'gravity'. The Moon and Mars have a surface gravity much less than Earth normal (which called 1g - the g stands for 'gravity'). The lunar surface is at roughly 1/6g and Mars is a 1/3g planet. Children raised in low-g cannot be expected to develop bones and muscles strong enough to visit Earth except in desperation -- it will be too painful and exhausting. For example, this author weighs 73kg (160 pounds). If I went to a 3g planet, the equivalent of moving from Mars to Earth, I would weigh 225 kg (almost 500 pounds) and would have great difficulty getting out of bed. For children raised on the Moon or Mars, attending college on Earth will be out of the question.
By contrast, orbital colonies can rotate to provide any g level desired, although it's not true gravity. Spinning the colony creates a force called pseudo-gravity, that feels a lot like gravity. Pseudo-gravity is much like what you feel when a car takes a sharp turn at high speed. Your body is pressed up against the door. Simillarly, as an orbital space colony turns, the inside of the colony pushes on the inhabitants forcing them to go around. The amount of this force can be controlled and for reasonable colony sizes and rotation rates the force can be about 1g. For example, a colony with an 895 meter (a bit less than 1000 yards) radius rotating at one rpm (rotations per minute) provides 1g at the hull. Children raised on orbital colonies should have no trouble visiting Earth for extended periods.

A2: No One Wants To Colonize Space

People will want to colonize Mars—economic incentives like higher pay will encourage space travel
Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics, **1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

Nevertheless, the order of magnitude of the $320,000 fare cited for early immigrants-roughly the cost of a upper-middle class house in many parts of suburban America, or put another way, roughly the life's savings of a successful middle class family - is interesting. It's not a sum of money that anyone would spend lightly, but it is a sum of money that a large number of people could finance if they really wanted to do so. Why would they want to do so? Simply this, because of the small size of the Martian population and the large transport cost itself, it is certain that the cost of labor on Mars will be much greater than on Earth. Therefore wages will be much higher on Mars than on Earth; while $320,000 might be 6 year's salary to an engineer on Earth, it would likely represent only 1 or 2 years' salary on Mars. This wage differential, precisely analogous to the wage differential between Europe and America during most of the past 4 centuries, will make emigration to Mars both desirable and possible for the individual. From the 17th through 19th centuries the classic pattern was for a family in Europe to pool it's resources to allow one of its members to emigrate to America. That emigrant, in turn, would proceed to earn enough money to bring the rest of the family over. Today, the same method of obtaining passage is used by Third World immigrants whose salaries in their native lands are dwarfed by current air-fares. Because the necessary income will be there to pay for the trip after it has been made, loans can even be taken out to finance the journey. It's been done in the past, it'll be done in the future.

People will want to colonize space to start new lives and find better opportunities
Asimov, author, former president of the American Humanist Association, and biochemist, **2003** (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)

This idea of space settlement seems odd to people; it doesn't seem inviting. When I suggested such an idea in an article I wrote a few years ago, I received a number of letters arguing against the possibility of space settlements. The arguments weren't based on economics; the main argument was that nobody would want to live in space. Nobody would want to leave his comfortable home on Earth. As nearly as I could tell from their addresses, all the people who wrote to me were Americans, and I presume that they knew American history. Americans should understand exactly what it means to leave their comfortable homes and to go to a completely strange world. This country was a wilderness at the beginning, and even after it was settled, it was a foreign land for most people. We in the United States are the descendants (unless any of you happen to be American Indians) of people who came here from other continents in search of something. Our forefathers, who came, at first, under harsh conditions, knew it would take them weeks to cross the ocean. They knew that if they met a serious storm, they would probably not survive. They also knew that when they landed, they would find a wilderness and possibly hostile natives. Yet, they still came. Between 1607 and 1617, 11,000 Englishmen came to the new colony of Virginia. In 1617, the population of Virginia was 1,000. How was it possible for 11,000 people to come and yet to have only a population of 1,000? The answer is easy; 10,000 died. Yet people continued to come. Why? They came because life in Europe, for many, was intolerable and because they wanted to come to a new land to start a new life. Whatever the risks, whatever the chances, if they succeeded it would be something new. It is this same desire that will drive people into space and cause them to populate as many space settlements as they can build. The chances of survival in space will probably be greater than those of the first immigrants to the colony of Virginia.

A2: No One Wants To Colonize Space

People will colonize space despite engineered environments—humans already live detached from the environment
Asimov, author, former president of the American Humanist Association, and biochemist, **2003** (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)

In their letters to me, some individuals wrote that people would not be able to endure the kind of engineered environment that would exist in the space settlements and that they wouldn't be able to bear not living close to nature as they do on Earth. Who lives close to nature here on Earth? There are millions of people on Earth who are never close to nature. I know; I live in the middle of Manhattan. I admit, I can look out the window and see Central Park from a distance, but I don't venture into it often. I think people should remember that the space settlements will probably be engineered to accommodate the comforts of the Earth's inhabitants. It is possible that people will be closer to nature in these settlements than in many places on the Earth today. People also wrote that the existence of space settlements would be unfair to the wretched of the Earth because the educated people would go into space and leave the less advanced people behind. That is probably precisely the reverse of what might happen. If we use the United States as an example, which classes of people came to this country? Obviously, the European ruling classes did not come; they were comfortable where they were. Why should they have left their homelands? The people who came to the United States were precisely those who hoped for something better, even if it meant a great deal of risk. Think of the passage engraved on the base of the Statue of Liberty: Give me your tired, your poor, Your huddled masses yearning to breathe free, The wretched refuse of your teeming shore. I know those lines, you see, because in 1923, I was one of the wretched refuse who passed through Ellis Island. I've never forgotten 1923 because it was the last year in which people could enter this country without question. After that, the word went through the hallowed halls of Congress, Asimov is in… close the golden door. In 1924, the first strict quotas were placed on immigration. If I had tried to come a year later, I might not have been allowed to enter.

Space settlement won't just be for the privileged—people from all classes will come to explore a new frontier
Asimov, author, former president of the American Humanist Association, and biochemist, **2003** (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)

I imagine that when the time comes to begin emigrating to the space settlements, it will be hard work to make sure that not only the wretched of the Earth but also the educated people with usable skills are included. It's going to be just the reverse of what people are afraid of. In fact, I have also been told in some letters that space colonization would be unfair because only those nations with a heritage of rocket travel, space flight, or of high technology would be able to take advantage of this new frontier, leaving the rest behind. Again, that idea flies in the face of historical fact. As an example, when my father decided to come to the United States, he hadn't the slightest idea of what the ocean looked like; he had never seen it. He had no heritage of ocean travel. I don't think he had any idea what a ship looked like unless he had seen a picture of one, and even when he was on the ship, he didn't know what kept it afloat or how anyone on the ship could tell where they were going when they were in the middle of the ocean. I'm not sure I know, frankly. Yet he managed to get to the United States without any tradition or knowledge of seafaring because he had something else. I will tell you what people will need to get to a space settlement: it isn't a background in rocketry, it isn't technological know-how, it isn't any tradition of high technology. I'll tell you what it is if you will pay close attention because it's rather subtle. What they will need is a ticket, because someone else is going to take them.

A2: Colonization ➔ Alien Genocide

Colonization of space won't lead to alien genocide—humans won't colonize inhabited planets
Engdahl, award-winning science fiction writer, **1994** (Sylvia, "Space and Human Survival, Part I," http://www.sylviaengdahl.com/space/survival.htm)

Colonies or Settlements? People sometimes object to the term "space colonies" on political grounds and for this reason NASA, along with some others, prefers the term "space settlements." The objection, however, strikes me as invalid. To be sure, "colonization" does have some bad associations, since on Earth it always involved taking over the land and/or culture of indigenous inhabitants—but that is precisely what a space colony would not do! Nobody, to the best of my knowledge, advocates colonizing inhabited planets, even if we should ever find any. The idea of expanding into space is to abandon our dependence on zero-sum games. A more accurate precedent for the term "colonize" in the space context is its meaning in biology: the establishment of a species' presence in a new ecological niche. I'm therefore glad to see "space colonies" prevailing on the Web.

Mars Key To Further Space Exploration

Space colonization is possible—Mars has sufficient resources for development and could act as a jumping off point for further exploration

Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics**, 1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

The economic viability of colonizing Mars is examined. It is shown, that of all bodies in the solar system other than Earth, Mars is unique in that it has the resources required to support a population of sufficient size to create locally a new branch of human civilization. It is also shown that while Mars may lack any cash material directly exportable to Earth, Mars' orbital elements and other physical parameters gives a unique positional advantage that will allow it to act as a keystone supporting extractive activities in the asteroid belt and elsewhere in the solar system. The potential of relatively near-term types of interplanetary transportation systems is examined, and it is shown that with very modest advances on a historical scale, systems can be put in place that will allow individuals and families to emigrate to Mars at their own discretion. Their motives for doing so will parallel in many ways the historical motives for Europeans and others to come to America, including higher pay rates in a labor-short economy, escape from tradition and oppression, as well as freedom to exercise their drive to create in an untamed and undefined world. Under conditions of such large scale immigration, sale of real-estate will add a significant source of income to the planet's economy. Potential increases in real-estate values after terraforming will provide a sufficient financial incentive to do so. In analogy to frontier America, social conditions on Mars will make it a pressure cooker for invention. These inventions, licensed on Earth, will raise both Terrestrial and Martian living standards and contribute large amounts of income to support the development of the colony.

Markets/Private Business Key To Space

Market expansion and funding are key to space transport and exploration
Space Access Society Feburary 2006 ("SAS's View of Things, As Of 2/15/06," http://www.space-access.org/updates/saspolcy.html)

Why Do We Believe This Is Possible? Current US launch costs are dominated by large fixed development, personnel, and facilities overheads amortized over a very small number of launches, plus the direct and indirect costs of throwing away or completely rebuilding the vehicle every flight. These are all legacies of the way we originally got into space, hiring small armies to inspect-in adequate quality to hastily-converted ballistic missiles. Fifty years later, we've institutionalized these methods into massive self-perpetuating bureaucracies rather than abandoning them as obsolete.
Somewhat counterintuitively, fuel costs are not a major obstacle to radically cheaper space launch. Current US launch costs are on the order of ten thousand dollars per pound delivered to low orbit. The total propellant cost for a generic liquid-oxygen/kerosene launcher is on the rough order of ten dollars per pound delivered to low orbit. Airlines, flying reusable vehicles at high flight rates, typically operate at overall costs of two to three times their fuel costs. There is no law of physics that prevents reusable rockets from approaching similar cost ratios. We pay the crippling current cost of US launch largely because of fifty years of entrenched bureaucratic bad habits.
OK, How Do We Go About Fixing This? We believe that radically cheaper access is possible in the near term with current technology, by operating reusable rockets with sufficiently lean organizations at sufficiently high flight rates. Rocketry has become more medium-tech than high, as witness (among other things) growing third-world missile proliferation. At the same time, modern lightweight materials and electronics greatly ease combining the necessary high performance, ability to abort intact in case of problems, and fast-turnaround small-groundcrew reusability. This lets us break away from the traditional expendable-missile "ammunition" design and "standing army" operations mindsets, with potential huge benefits to cost and reliability. What's been lacking to date has been the proper combination of reasonable goals (it's DC-3 time, not 747), sensible focussed management, inspired engineering (KISS!), and funding. Much depends on a leap of faith - faith in the studies that show large new markets emerging at lower launch costs to support the necessary higher flight rates - "if you build it, they will come".
Market studies do strongly indicate that somewhere around one-tenth of current US launch costs, the market for space launch will reach a tipping point where demand for launches starts expanding fast enough to more than make up for reduced per-launch revenue. The overall launch market will start growing rapidly at that point, as investment in further launch cost reductions changes from a leap of faith to a sure thing. Further cost reductions will drive further market expansion, to the point where the space transport market will rapidly begin to approach the air transport market in economic importance. (At least two such new markets, tourism and post revolution-in-military-affairs defense, are already growing steadily less speculative. The chief thing we can predict about the other new markets that will appear as costs drop is that they'll surprise us. Who would have predicted in 1952 that, say, fresh flowers would be profitably airfreighted across oceans?)
Our Major Goal Our major goal at Space Access Society is to help bootstrap space transportation costs downward to the point where this virtuous circle gets underway. We see this as the approach to humanity permanently expanding off this planet with by far the best chance of success. Government programs come and go, but if there's profit in a thing it's here to stay.

Government control will fail – private markets are key to space
Paul, US Representative and former presidential candidate of the Libertarian Party, **1988** (Ron, "Space—Domestic Policy, Position Paper," http://www.islandone.org/Politics/LP.space-dom.html)

Even worse, this failed state monopoly is now wrecking businesses to avoid well deserved embarassment. American companies desperately need to get their satellites into space. They have been blocked from using the cheapest, most reliable launcher in the world which unfortuneately happens to be the Soviet Proton. NASA has cost our nation a full twenty years in space development, twenty years that has seen the Soviet Union surpass us to an extent that may well be irreparable. It is inconceivable that a private firm could have committed such follies and survived. NASA deserves no better. Our only hope now lies in the power of free individuals risking their own resources for their own dreams. We must recognize the government led space program is dead and the corpse must be buried as soon as possible. Any defense functions should be put under the military, and the rest of NASA should be sold to private operators. The reciepts would be applied to the national debt. Then, all government roadblocks to commercial development of space must be removed.
It is not the business of the defense department of a free society to veto business decisions of remote sensing or launch companies. The interests of liberty would be well served by a bevy of mediasats that will put any future Iran-Contra affair under the full glare of live television coverage. Maybe, besides competition, that's what our government is afraid of.There is really only one proper role for the military in space or on Earth: the protection of America. Otherwise, the new frontier of Space should be opened to all. Space pioneers will generate knowledge and wealth that will improve the lot of all people on earth. We should not let government get in their way. Our government is not only shortsighted in it's negotiations on space issues, it's downright anti-american. Sometimes it's hard to decide whose principles the State Department is defending. They certainly aren't those of our Founding Fathers.

Markets/Private Business Key To Space

Unrestrained business development will open up the solar system to exploration and commerce
Paul, US Representative and former presidential candidate of the Libertarian Party, **1988** (Ron, "Space—International Policy, Position Paper," http://www.islandone.org/Politics/LP.space-int.html)

About the only anti-property treaty this country hasn't ratified is the odious "Moon Treaty", written by our own State Department. If not for an alert group of citizens (L5 Society), the United States would have ratified this treaty under President Carter and embraced control of all the rest of creation by a World Government. Under "the common heritage of all mankind" space would be the heritage of no one. The vast wealth of resources and energy in our solar system would remain untapped instead of being explored by entrepreneurs who would improve the condition of all humanity. It's time this sick treaty is repudiated once and for all.
We must also demand a revision or understanding to the 1967 Outer Space Treaty so individual property rights are recognized. If there are no implimenting protocols for property rights within a specified time limit we should withdraw from the treaty entirely. In any case, we should immediately open a land office and accept claims of Americans to specific pieces of land, subject to occupancy within 15 years.
Back in the late 1950's a project called Orion seriously considered using small nuclear explosions to power a spacecraft. The lifting capacity would have been vast, measured in thousands of tons instead of the miniscule abilities of today's mightiest rockets. This brute-force approach was simple enough to be considered feasible 30 years ago. Unfortuneately, the idea was shelved by the 1963 Nuclear Test Ban Treaty.
If we truly wish to see the opening of the space frontier, we must not prevent businesses from working on futuristic ideas like fusion drives or matter-antimatter engines. Such technologies will one day open the solar system to commerce the way the clipper ship opened the oceans in the 19th century.

Central planning – government can't get us into space
Davidson, President of the Houston Space Society and member of the Atlantis Project," 1995 (Jim, "Freedom Needs Frontiers," January **1995**, http://www.islandone.org/Policy/TheFutureWeWant.html)

What I didn't realize at the time, and what many space activists still do not accept, is that our desires were never reflected in the space program. Most of us felt that the way to make space settlement a reality was to support the government space program. We were encouraged in this view by Congressional staffers, aerospace industry leaders, and others involved in the complex of organizations surrounding NASA. Many still feel this way. We were wrong. Frontiers are not opened by governments. They are not opened by centrally planned efforts. They are opened chaotically, by the motives that can drive tens of thousands of people, by self-interest, by tens of thousands of different ideas of what is possible and desirable. Governments did not build clipper ships, railroads, covered wagons, riverboats, or any of the instruments that opened frontiers to settlement. Governments at best encouraged certain lines of inquiry. So supporting government space development was never very productive and in many ways counterproductive.

Private commercial efforts are crucial for the colonization of space—government programs won't be sufficient
Davidson, President of the Houston Space Society and member of the Atlantis Project," **1995** (Jim, "The Future We Want," June 1995, http://www.islandone.org/Policy/TheFutureWeWant.html)

And in 1988, our interests were completely betrayed. We, who want people to live and work in space, would have benefited enormously from the private efforts of Space Industries to develop a commercial man-tended space platform. Funds were allocated for that project to provide an anchor tenant. Four Senators led an effort to kill it. And the leadership of one of the largest space activist groups chose to let it die. We have all seen the subsequent events. NASA is now threatened not by battles for funding allocation, but by the loss of its arch-rival and the end of the Cold War. The space station has been transformed so many times that it makes some of us weep, but it seems to be on the path to completion. The NASA space science program fell into disarray with Galileo and Mars Observer (and Hubble), and had already pissed away half the science of the Ulysses mission by not requesting funds for the Solar Polar Probe. Perhaps that space science program will be fixed with the call for Faster, Cheaper, Better.
But we have all lost an incredible amount of time. All of the momentum of Apollo is gone. In 1970, we were going to the Moon. In 1995, this country is going into Earth orbit. Then we dreamed of going on to Mars, with hundreds living in Earth orbit and dozens living on the Moon. Today we dream of keeping the flame lit, we hear about "next logical steps," and we wonder why no one shares our dreams. What conclusions can we draw? Several spring to mind: Large government projects create bureaucratic infrastructure. Bureaucracies fight for their own survival and guard their turf. Large projects lack the many robust characteristics of small projects. Government projects tend to grow. Until we demonstrate that ordinary people can get into space, very few will pay attention to us.

Markets/Private Business Key To Space

Business development is key to space exploration and settlement—government programs won't generate enough will or resources
The Space Review 2005 (Stephen Ashworth, "The mission, the business, and the tandem (part 1)," January 31, http://www.thespacereview.com/article/312/1)

Political will, however, is not the only relevant factor. For those who advocate the business or private enterprise model of spaceflight, the future of humans in space does not belong to official astronauts, wearing national flags on their shoulders and flying special government missions for science and technology. Rather it is one whose spacecraft simply carry crew and passengers on scheduled services, open to all who can pay, flying into and through space in pursuit of goals defined by those passengers.
The current official attitude to exploration of the Moon and Mars clearly leans towards space as holy ground, not to be defiled by the masses or debased by an activity as mundane as making money. On the space agency model, a mission is affordable if its costs are covered by the budget of a program acceptable to politician and taxpayer. But on the business model, affordability is sought in terms of matching the revenue from passengers and cargo to the costs of operating a spacecraft plus a reasonable profit margin, in the same way as for any other commercial transport system—airliner, business jet, ship, railway, coach, bus, rental car, hot-air balloon.
Again, on the space agency model, space infrastructure remains a government monopoly for the foreseeable future, to be used only by a handful of space agency employees and occasional special guests, after years of training. But on the business model, the ownership of space infrastructure should be as diverse as the ownership of ships and aircraft, ports and harbors, on, say, the transatlantic route, and used by increasing numbers of private citizens. Space agency employees queue up along with everyone else when they want to purchase a ticket. What, after all, are humans doing in space? There is an ideological question here: should one accept the views of those who believe that the human race is "destroying" Earth and must not be allowed to damage other planets? Their view is summed up in the motto: "Take only photos, leave only footprints." They are appalled by the mindset that would bulldoze the Moon's craters flat, crash comets onto its surface to provide volatiles, build a flashy visitor center and attract uncomprehending visitors by the millions, to use our natural satellite as a playground and drop litter on its ancient plains. The hope that the continuous application of sizeable government space budgets will lead incrementally and inevitably to permanent extraterrestrial settlements is very much a hostage to fortune.
The goal of making it possible for adventurous spirits to live permanently away from Earth, exploiting the vast untapped resources of space, is therefore at cross-purposes with another goal: that of keeping such people out of space, and allowing only scientific explorers access to the rest of the solar system. Those who would use the asteroids, moons and planets to mine raw materials and build a hotel, a frontier settlement, a thriving city, have first to run the gauntlet of those who demand that the extraterrestrial universe must be kept in pristine condition: uncontaminated, unpolluted, undeveloped, and uninhabited by anyone but the purest-minded of scientific hermits. The current official attitude to exploration of the Moon and Mars clearly leans towards space as holy ground, not to be defiled by the masses or debased by an activity as mundane as making money. They do not often say this explicitly, but it is implicit in every effort they make to drive up the cost of access and discourage entrepreneurs.

Human innovation of the free market will develop space travel and colonization
Block, professor and chair of economics, college of business administration, at Loyola University**, 2000** (Walter, "Free Market Economies: Reply to Dwight Murphey," http://www.mises.org/journals/scholar/Walter3.PDF)

Either human wants are without limit or they are not. There is no third possibility which is not a combination of these two. Let us, then, consider each of these scenarios in turn. First, by far the more realistic one: human desires are without end. If this is true, we may in our mind's eye compose a list, an infinitely long ledger of goals. This would include everything from more artistic and cultural development, to a cure for all diseases, to infinite life, to exceeding the speed of light, to exploring the ocean depths and the core of the earth, to creating new species, to engaging in inter galactic travel and colonization. At any given time, the number of human beings, their skills and effort, our technology and capital savings limits how far down on this "wish list" we may reach9. Every time a new innovation occurs, this is not the occasion for luddite gnashing of teeth; instead, we rejoice. The economy does not become more "workerless"; rather, we are enabled to move a little bit further down the inventory of things we want but do not have. Labor is no longer needed to do things the new technology (e.g., robotics) can now accomplish for us; instead it is freed up to engage in tasks which will garner for us that which was previously unobtainable. And this process continues ad infinitum, given our assumption of endless desires.

Markets/Private Business Key To Space

Private market participation is key to space exploration, colonization, and development
Ashworth, journalist and Fellow of the British Interplanetary Society, **2005** (Stephen, The Space Review, "The mission, the business, and the tandem (part 2)," January 31, http://www.thespacereview.com/article/316/1)

And so it was that no Chinese junk floated in on the tide to disturb the sleep of the burghers of London, Portsmouth, Hamburg, Venice, Lisbon, Cadiz, or Amsterdam. When globalization began in earnest, it was carried like a virus in the holds of Portuguese, Spanish, Dutch, English, and French caravels, seeking gold, spices, slaves, silks, tea, cotton, and many other profitably tradable goods.
There is a lesson here for the "multiglobalization" of the future. It should be clear that the most important function of humans in space—the most significant one on a historical timescale—will be our use of extraterrestrial resources for economic growth.
Linking public and private space Interplanetary civilization can only be founded on the dynamism and discipline of the market. It needs the market's broad base, resting as it does on the demand of the whole people, not just the dreams of a visionary elite. The transformation of society from a regional to a global level of organization (say 1500–2000), or from a global to a multiglobal level (likely to be the big theme of 2000–2500), cannot be decreed from above. It must take place as an evolutionary, system-level phenomenon, one in which all parts of society play a role, but where no single part succeeds in controlling the outcome. Otherwise it will not be carried through to completion, but remain a failed project, a grandiose dream—perhaps one whose successes are later doubted, as some people now doubt whether the Apollo astronauts ever really walked on the Moon, perhaps even one whose achievements are completely forgotten for half a millennium or more.
This is not to deny the value of vision, of government leadership. Many voyages of pure exploration were necessary before the routes to the East Indies or the West Indies were able to return a profit. The question that is crucial for the future growth of our own civilization is therefore this: what is the correct relationship between the space agency and private enterprise? How can the space mission and the space business work together, efficiently and creatively? If space exploration is like the vanguard of an army, advancing into hostile territory, commercial business is like that army's supply train, generating new wealth faster than the vanguard can consume it. If the vanguard gets too far ahead of the supply train, it will run short of food, fuel and ammunition. It will suffer defeat and be forced into retreat. This is what happened to the Ming treasure junks and to Apollo. It is what threatens to befall Apollo's successors: in America, NASA's Vision for Space Exploration; in Europe, ESA's Aurora program. I propose that the key to both affordability and sustainability is to ensure that the supply train advances in step with the vanguard. In other words, wherever astronaut explorers go, entrepreneurs, industrialists, adventure tourists, and, ultimately, colonists are never far behind. The solar system offers us a graded sequence of problems, like a giant staircase stretching out towards the stars: suborbital space hops, low Earth orbit, high orbit, lunar flyby, lunar landing, asteroid visits, Mars, and so on. Each step has greater energy and life-support demands than the preceding one. On the space agency model, after government explorers have scaled each of these steps, it remains subsequently under the exclusive control of the agencies. They are unwilling to relinquish power or property rights to the market. Private enterprise must be kept penned in on Earth—or maybe, if it is very, very good, it will be allowed to carry out one or two very simple commercial activities in space, but only after many decades more of government research.
The model that I am offering here is quite different. When horses are harnessed in tandem, or when cyclists ride in tandem, this means that the two are harnessed, or sit, one directly behind the other. They travel together. Like the vanguard and the supply train, where one leads, the other immediately follows. This relationship between the public vanguard, flying missions of exploration, and the private supply train, flying businesses into space, is what is necessary to achieve the goals of an affordable and sustainable space frontier. They must move together in tandem. It follows that each step of the cosmic staircase should be colonized by the market before the next step is visited by human explorers. Agency astronauts should not be permitted to fly again beyond low Earth orbit until regular commercial access to low Earth orbit has been assured. They should not fly beyond the Moon until commercial access to the Moon has been assured. The space agency should always be in the position of giving a helping hand up to the entrepreneur, rather than making excuses: space is too expensive, too dangerous, or too fragile for any but our highly-trained astronauts to dare to venture out there! If agency programs of manned spaceflight are to achieve the reasonable goal of making a permanent addition to the material wealth of mankind, the agencies themselves need to be drastically reformed. They must be motivated to work with space entrepreneurs, rather than ignore or even actively frustrate them, as they have been doing in recent years. They must be forced to give up their natural tendencies to monopolize human spaceflight and to suppress innovation.

Private sector and market developments are key to sustainable space exploration and colonization
Foust, editor and publisher of The Space Review and Space Politics, November **2005** (Jeff, The Space Review, "Exploiting the Moon and saving the Earth," http://www.thespacereview.com/article/490/1)

To achieve an affordable and sustainable exploration vision, Worden believes, "the private sector must play not just a role, but a dominant role." The government, Worden believes, is best fit for providing the infrastructure needed for lunar exploration, what he called the "roads and commodes" it provides on Earth. "That's a function that governments do really well," he said. "It doesn't take a lot of imagination, but it does take persistence." For the Moon, that infrastructure comes in several forms, including communications, PNT (position, navigation, and timing, provided on Earth by GPS), "situational awareness" (maps and other remote sensing techniques), and power. Even here there is a role for the private sector. One model for infrastructure building, Worden noted, is the transcontinental railroad built in the US in the 1860s: it was built privately, financed by the large land grants given to the builders by the government. "With private ownership you can finance just about anything," he noted. The second approach is government-funded and operated infrastructure, such as GPS. However, Worden believes GPS hasn't reached its full potential because there is no private ownership; he sees Europe's Galileo system, a public-private partnership, as "a move in the right direction".
That infrastructure, once in place, opens up a number of possible uses of the Moon, including options for the private sector usually associated only with the government. One example is astronomy: while normally linked with government efforts funded by NASA and NSF, Worden noted that many terrestrial telescopes, even some of the large next-generation telescopes under development, are privately funded to the tune of $500 million to $1 billion. A large liquid-mirror telescope on the Moon, 20 to 30 meters in diameter, could stare at one point in the sky and see objects as dim as magnitude 37 or 38—faint enough to look back to just 100 million years after the Big Bang. Such a telescope could cost about $1 to 2 billion—within the budgets of private financiers—if "significant infrastructure" to support the observatory is in place. (Worden has been studying the development of such a telescope under a grant from the NASA Institute for Advanced Concepts.)

Space Colonization Inevitable

Space colonization is inevitable—We have the technological capacity to expand
Asimov, author, former president of the American Humanist Association, and biochemist**, 2003** (Isaac, Speech at Rutgers University, "Our Future in the Cosmos—Space," http://www.wronkiewicz.net/asimov.html)

I want to discuss our future in the cosmos. One of the things I think will mean the most to us and will make the future different from the past is the coming of a space-centered society. We are going to expand into space, and I think it is fitting and right that we should do so. All through the 50,000 years of Homo sapiens, to say nothing of their hominoid precursors, humanity has been expanding its range of habitation. We don't know exactly where the first Homo sapiens made their appearance, but they have been expanding until they now inhabit the entire face of the Earth. For the first time in human history, we are faced with a situation in which we literally have no place on Earth to expand. We have crossed all the mountains; we have penetrated all the oceans. We have plumbed the atmosphere to its height and the oceans to their depths. Unless we are willing to settle down into a world that is our prison, we must be ready to move beyond Earth, and I think we are ready. We have the technological capacity to do so; all that we need is the will. I think it is quite possible, starting now, to build settlements in space, to build worlds miniature in comparison to the Earth but large in comparison to anything we have done so far. These worlds, in orbit around the Earth, would be capable of holding tens of thousands of human beings.

Technological advancement makes space colonization inevitable
David, Senior space writer for space.com**, 2005** (Leonard, "Space Colonization: The Quiet Revolution," February 23, http://www.space.com/businesstechnology/technology/space_colonization_050223.html)

At present, a number of technologies are being developed for other applications by non-aerospace industries deemed useful in fostering space colonization. These technologies will automate many aspects of large scale space system development, as well as drive down costs – thereby advancing the onset of colonization. That's the view among a group of visionary practitioners of the future taking part in the Space Technology & Applications International Forum (STAIF), held here February 13-17.
Giggle factor gone Advances in such areas as propulsion, power, using space resources, and giving other worlds a planetary makeover through terraforming — along with public space travel — are hastening the day of space colonization. .
Backing that view is Eric Rice, chair of a symposium on space colonization held at STAIF this year. Rice is leader of an American Institute of Aeronautics and Astronautics (AIAA) technical committee that focuses on space colonization issues.
"There are so many things underway now that relate to space colonization. The International Space Station is part of this too, as well as the long-term potential for terraforming Mars into another planet for humans to live on," Rice told SPACE.com.
Rice said that the growing business of public space tourism "is really the spirit of colonization." The giggle factor of citizen space travelers is totally gone, he said.

Space colonization is inevitable—Space organizations are committed to establishing a civilization
The Space Review 2005 (Stephen Ashworth, "The mission, the business, and the tandem (part 1)," January 31, http://www.thespacereview.com/article/312/1)

If governments are to deliver sustainable progress in space, then at the very least the goal of interplanetary civilization will have to be deeply embedded in their institutional psyches.
If this constant effort is extended over several decades, a gradually increasing permanent space infrastructure is seen as the inevitable result, extending to the Moon and later to Mars. Such is the model upon which ESA's Aurora program is founded, while optimistically avoiding the question of whether Europe can muster the political will to spread its wings and fly independently of the NASA nest. It is the implicit basis of NASA's Vision for Space Exploration. It is the paradigm promoted by the detailed report on the future of space, led by Wesley T. Huntress, president of The Planetary Society, and published in July 2004 by the International Academy of Astronautics.

Space Exploration Bad Frontline

Space exploration will cause environmental exploitation, nuclear annihilation, arms races, and epidemics
Gagnon, Coordinator of the Global Network Against Weapons & Nuclear Power in Space, **1999** (Bruce K., "Space Exploration and Exploitation," http://www.space4peace.org/articles/scandm.htm)

We are now poised to take the bad seed of greed, environmental exploitation and war into space. Having shown such enormous disregard for our own planet Earth, the so-called "visionaries" and "explorers" are now ready to rape and pillage the heavens. Countless launches of nuclear materials, using rockets that regularly blow up on the launch pad, will seriously jeopardize life on Earth. Returning potentially bacteria-laden space materials back to Earth, without any real plans for containment and monitoring, could create new epidemics for us. The possibility of an expanding nuclear-powered arms race in space will certainly have serious ecological and political ramifications as well. The effort to deny years of consensus around international space law will create new global conflicts and confrontations.

Space exploration will inevitably lead to space militarization
Gagnon, Coordinator of the Global Network Against Weapons & Nuclear Power in Space, **1999** (Bruce K., "Space Exploration and Exploitation," http://www.space4peace.org/articles/scandm.htm)

The Pentagon, through the U.S. Space Command, is working hard to ensure that the space corridor will remain open and free for private corporate interests. Weapon systems such as nuclear powered lasers and anti-satellite (ASAT) weapons are now being funded, researched, and tested in the U.S. It will only be a matter of time until deployment of space based weapons will follow. In the Space Command's document, Vision for 2020, they state that "Historically, military forces have evolved to protect national interests and investments – both military and economic. During the rise of sea commerce, nations built navies to protect and enhance their commercial interests. …The control of space will encompass protecting U.S. military, civil and commercial investments in space…. Control of space is the ability to assure access to space, freedom of operations within the space medium, and an ability to deny others the use of space, if required." A parallel, military highway will be created between the Earth and the planets beyond. Documents commissioned by the U.S. Congress suggest that U.S. military bases on the Moon will enable the U.S. to control access to and from the planet Earth. The logo of the U.S. Space Command is "Master of Space."

Space Militarization is totally destabilizing and risks catastrophic war
Mitchell et al in '01
(Gordon, Kevin Ayotte and David Cram Helwich, Associate Professor of Communication and Director of Debate at University of Pittsburgh, Teaching Fellows in the Department of Communications at University of Pittsburgh, ISIS Briefing on Ballistic Missile Defense #6, "Missile Defence: Trans-Atlantic Diplomacy at a Crossroads", July, http://www.isisuk.demon.co.uk/0811/isis/uk/bmd/no6_paper.html)

A buildup of space weapons might begin with noble intentions of 'peace through strength' deterrence, but this rationale glosses over the tendency that '… the presence of space weapons…will result in the increased likelihood of their use'.33 This drift toward usage is strengthened by a strategic fact elucidated by Frank Barnaby: when it comes to arming the heavens, 'anti-ballistic missiles and anti-satellite warfare technologies go hand-in-hand'.34 The interlocking nature of offense and defense in military space technology stems from the inherent 'dual capability' of spaceborne weapon components. As Marc Vidricaire, Delegation of Canada to the UN Conference on Disarmament, explains: 'If you want to intercept something in space, you could use the same capability to target something on land'. 35 To the extent that ballistic missile interceptors based in space can knock out enemy missiles in mid-flight, such interceptors can also be used as orbiting 'Death Stars', capable of sending munitions hurtling through the Earth's atmosphere. The dizzying speed of space warfare would introduce intense 'use or lose' pressure into strategic calculations, with the spectre of split-second attacks creating incentives to rig orbiting Death Stars with automated 'hair trigger' devices. In theory, this automation would enhance survivability of vulnerable space weapon platforms. However, by taking the decision to commit violence out of human hands and endowing computers with authority to make war, military planners could sow insidious seeds of accidental conflict. Yale sociologist Charles Perrow has analyzed 'complexly interactive, tightly coupled' industrial systems such as space weapons, which have many sophisticated components that all depend on each other's flawless performance. According to Perrow, this interlocking complexity makes it impossible to foresee all the different ways such systems could fail. As Perrow explains, '[t]he odd term "normal accident" is meant to signal that, given the system characteristics, multiple and unexpected interactions of failures are inevitable'.36 Deployment of space weapons with pre-delegated authority to fire death rays or unleash killer projectiles would likely make war itself inevitable, given the susceptibility of such systems to 'normal accidents'. It is chilling to contemplate the possible effects of a space war. According to retired Lt. Col. Robert M. Bowman, 'even a tiny projectile reentering from space strikes the earth with such high velocity that it can do enormous damage — even more than would be done by a nuclear weapon of the same size!'. 37 In the same Star Wars technology touted as a quintessential tool of peace, defence analyst David Langford sees one of the most destabilizing offensive weapons ever conceived: 'One imagines dead cities of microwave-grilled people'.38 Given this unique potential for destruction, it is not hard to imagine that any nation subjected to space weapon attack would retaliate with maximum force, including use of nuclear, biological, and/or chemical weapons. An accidental war sparked by a computer glitch in space could plunge the world into the most destructive military conflict ever seen.

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Space Exploration Bad Frontline

Space exploration will lead to the spread of pathogenic viruses through biohazardous land samples
Gagnon, Coordinator of the Global Network Against Weapons & Nuclear Power in Space**, 1999** (Bruce K., "Space Exploration and Exploitation," http://www.space4peace.org/articles/scandm.htm)

Potential dangers do exist though. Barry DiGregorio, author and founder of the International Committee Against Mars Sample Return, has written that "…any Martian samples returned to Earth must be treated as biohazardous material until proven otherwise." At the present time NASA has taken no action to create a special facility to handle space sample returns. On March 6, 1997 a report issued by the Space Studies Board of the National Research Council recommended that such a facility should be operational at least two years prior to launch of a Mars Sample Return mission. Reminding us of the Spanish exploration of the Americas, and the smallpox virus they carried that killed thousands of indigenous people, DiGregorio warns that the Mars samples could "contain pathogenic viruses or bacteria." There are vast deposits of mineral resources like magnesium and cobalt believed to be on Mars. In June of 1997, NASA announced plans for manned mining colonies on Mars, expected around 2007-2009. The mining colonies, NASA says, would be powered by nuclear reactors launched from Cape Canaveral, Florida.

Extinction
Daswani, 96 (Kavita, South China Morning Post, 1/4, lexis)

Despite the importance of the discovery of the "facilitating" cell, it is not what Dr Ben-Abraham wants to talk about. There is a much more pressing medical crisis at hand - one he believes the world must be alerted to: the possibility of a virus deadlier than HIV. If this makes Dr Ben-Abraham sound like a prophet of doom, then he makes no apology for it. AIDS, the Ebola outbreak which killed more than 100 people in Africa last year, the flu epidemic that has now affected 200,000 in the former Soviet Union - they are all, according to Dr Ben-Abraham, the "tip of the iceberg". Two decades of intensive study and research in the field of virology have convinced him of one thing: in place of natural and man-made disasters or nuclear warfare, humanity could face extinction because of a single virus, deadlier than HIV. "An airborne virus is a lively, complex and dangerous organism," he said. "It can come from a rare animal or from anywhere and can mutate constantly. If there is no cure, it affects one person and then there is a chain reaction and it is unstoppable. It is a tragedy waiting to happen." That may sound like a far-fetched plot for a Hollywood film, but Dr Ben -Abraham said history has already proven his theory. Fifteen years ago, few could have predicted the impact of AIDS on the world. Ebola has had sporadic outbreaks over the past 20 years and the only way the deadly virus - which turns internal organs into liquid - could be contained was because it was killed before it had a chance to spread. Imagine, he says, if it was closer to home: an outbreak of that scale in London, New York or Hong Kong. It could happen anytime in the next 20 years - theoretically, it could happen tomorrow. The shock of the AIDS epidemic has prompted virus experts to admit "that something new is indeed happening and that the threat of a deadly viral outbreak is imminent", said Joshua Lederberg of the Rockefeller University in New York, at a recent conference. He added that the problem was "very serious and is getting worse". Dr Ben-Abraham said: "Nature isn't benign. The survival of the human species is not a preordained evolutionary programme. Abundant sources of genetic variation exist for viruses to learn how to mutate and evade the immune system." He cites the 1968 Hong Kong flu outbreak as an example of how viruses have outsmarted human intelligence. And as new "mega-cities" are being developed in the Third World and rainforests are destroyed, disease-carrying animals and insects are forced into areas of human habitation. "This raises the very real possibility that lethal, mysterious viruses would, for the first time, infect humanity at a large scale and imperil the survival of the human race," he said.

Extensions: Space Exploration ➔ Militarization

Space travel and colonization allows for the unchecked nuclearization of space
Gagnon, Coordinator of the Global Network Against Weapons & Nuclear Power in Space, **1999** (Bruce K., "Space Exploration and Exploitation," http://www.space4peace.org/articles/scandm.htm)

Nuclear power has become the power source of choice for NASA. Not only has NASA, and the Department of Energy (DoE), been promoting the use of nuclear power for on-board generators for deep space missions, but there is growing evidence that the space exploration and exploitation "adventure" will soon be awash in nuclear materials. According to Marshall Savage, the founder of the First Millennial Foundation (a pro-space colonization organization), "We really can't mess up the Moon, either by mining it or building nuclear power plants. We can ruthlessly strip mine the surface of the Moon for centuries and it will be hard to tell we've even been there. There is no reason why we cannot build nuclear power plants on the Moon's surface with impunity. Equipped with limitless nuclear, the lunar civilization will be capable of prodigious rates of economic growth." One cannot help but wonder what would happen to the poor Moon miner who becomes contaminated by radioactive dust after removing his irradiated space suit inside the lunar habitat. There is a growing call as well for the nuclear rocket to Mars. Already work is underway on the project at Los Alamos Labs in New Mexico and at the University of Florida Nuclear Engineering Department. In his Space News op-ed called Nuclear Propulsion to Mars, aerospace industry engineer Robert Kleinberger states that the nuclear rocket "could be used for defending U.S. space systems, reboosting the International Space Station, returning to the Moon for exploration or mining, and for exploring and opening the inner solar system to scientific research. The nuclear vehicle could even assist in the eventual colonization of Mars." In fact, there is such a growing demand for plutonium for "space projects" that the DoE is now undertaking an internal review of its production process. The DoE is considering re-opening plutonium processing lines at such facilities as Hanford in Washington state, a site that has created enormous contamination during its years of bomb making.

Space exploration and colonization sparks militarization and a global arms race
Gagnon, Coordinator of the Global Network Against Weapons and Nuclear Power in Space, **no date given** (Bruce K., "Statement of Concern," http://www.space4peace.org/statement/concern.htm)

But there are obstacles to U.S. space "dominance". Present international space law speaks against the notion of U.S. space control. The Outer Space Treaty of 1967, signed by the U.S. and 90 other countries, affirms "the peaceful purposes" of outer space and forbids "weapons of mass destruction" from being deployed in space. This same space law also declares that all interplanetary bodies belong to the common good. As NASA lands on the moon and Mars and explores other planets they are finding gold, cobalt, magnesium, helium 3 and other rich resources. Plans are now underway to place mining colonies on these bodies. The U.S. is now exploring ways to circumvent international space law in order to "exploit" these planetary bodies so that corporate interests may secure the enormous financial benefits expected from this Mining the Sky as is described by NASA scientist John Lewis in his book by the same title.
The Columbus mythology is often invoked to describe our "manifest destiny" as it relates to space exploration and colonization. The noble explorer theme is used to cover the more practical notion of profits to be made in regards to space. There is big money to be made building and launching rockets. There is money to be made building and launching satellites. There is money and power to be derived by "controlling" space. And there is money to be made mining the sky. Another obstacle exists though. If the U.S. can "control" space, so might another nation. Thus we have the early stages of an arms race in space. How will France, Russia, China or any other nation respond as the U.S. consolidates its "control" of space?
In order to ensure that the Pentagon maintains its current space military superiority the U.S. Space Command is now developing new war fighting technologies like the Ballistic Missile Defense (BMD) and Anti-satellite weapons (ASATS) as well as space based laser weapons. Star Wars is alive and well. Recent efforts to move toward early deployment of the BMD system, which could easily be used for offensive purposes, is expected to break the 1972 ABM Treaty as well as the Outer Space Treaty.

Space colonization increases nuclear production and arms races
Gagnon, Coordinator of the Global Network Against Weapons and Nuclear Power in Space, **no date given** (Bruce K., "Statement of Concern," http://www.space4peace.org/statement/concern.htm)

Nuclear power in space becomes a key ingredient in the plans for space colonization and domination. Nuclear power is seen by NASA as an appropriate power source for interplanetary missions. Nuclear rockets are envisioned for trips to Mars and nuclear powered mining colonies are planned for the moon and Mars.
At the same time the U.S. Space Command sees nuclear power as the primary source for the enormous amounts of power generation that will be required for space weapons. The Department of Energy (DoE) laboratories throughout the U.S., casting about for a new role as the need for more nuclear weapons diminishes, views space as a great new opportunity for their on-going nuclear production work. Labs like Hanford (Washington state); Savannah River Plant (South Carolina); Los Alamos (New Mexico); Lawrence Livermore (California); and INEL (Idaho) are already heavily involved in space nuclear power production efforts.
As we prepare to move into the 21st century it is crucial for peace and environmental activists to view space as an area of concern. The enormous expenditures of our tax revenues for space must be questioned. The morality and ethics of moving an arms race into space must be vigorously debated. The environmental consequences of U.S. space policy must be explored and resisted.
But most importantly, the question of the kind of seed we carry from earth into the heavens must be considered by the people of our planet. Are we to allow the U.S., and other nations, to carry the bad seed of warfare, greed, exploitation and environmental contamination into space? The Columbus mythology does indeed fit. Only it reminds us that the single mindedness that pursues profits and power in the "New World" will also carry grave implications for centuries to come. Now is our brief chance in history to prevent a great wrong from occurring. Now is the time that we must organize a global call to resist the nuclearization and weaponization of space. We must make space for peace.

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Space Colonization Dangerous And Infeasible

Space exploration is expensive, time consuming, and dangerous
Robertson, freelance space industry journalist, **2006** (Donald F., "Space Exploration: A Reality Check," March 6, http://www.space.com/spacenews/archive06/RobertsonOpEd_030606.html)

Two largely unquestioned assumptions long ago took root within the space community. As we prepare to voyage back to Earth's Moon and on to Mars, it is time to question them both.
The first assumption is that exploring the Moon, Mars, or any part of the solar system, can be accomplished in a generation or two and with limited loss of life. The second is that we can use robots to successfully understand another world. Both assumptions are almost certainly wrong, yet many important elements of our civil space program are based on one or both of them being correct.
To paraphrase Douglas Adams, even within the space community most people don't have a clue how "mind-boggingly big space really is." Most of the major worlds in the solar system have surface areas at least as large as terrestrial continents — a few are much larger — and every one of them is unremittingly hostile to human life. Learning to travel confidently through former President John F. Kennedy's "this new ocean" will be difficult, expensive, time-consuming and dangerous.

Space exploration and colonization will be extremely dangerous and costly
Robertson, freelance space industry journalist, **2006** (Donald F., "Space Exploration: A Reality Check," March 6, http://www.space.com/spacenews/archive06/RobertsonOpEd_030606.html)

Dramatic increases in exploration funding are not likely in the foreseeable future. If we are going to make progress toward truly understanding the Moon and Mars, we must send scientists while staying close to existing budgets. Whatever the dangers, we must proceed with our existing tools and technologies.
Dangerous it will be. Detailed exploration, let alone settlement, of nearby worlds will be the single most difficult task humanity has ever tackled. Most likely, it will take many hundreds, or even thousands, of years. Our first attempts to establish a base on Earth's Moon or Mars may well fail. As on the oceans, many people will die: we cannot insist on levels of safety that make the exercise technically impractical or unaffordable.

Space Colonization Impossible – Can't Survive On Other Planets

Space colonization is impossible—The land is unhabitable, and scientists refuse to address technical issues
Bell, former space scientist and Adjunct Professor for Planetary Science at the Hawai'i Institute of Geophysics & Planetology at the University of Hawaii, **2005** (Jeffrey F., "The Dream Palace of the Space Cadets," Nov.25, http://www.spacedaily.com/news/oped-05zzb.html)

Unfortunately, the new generation of organizations like the Space Frontier Foundation and the Mars Society and even the staid National Space Society mostly lack something that the old L-5 Society and Space Studies Institute had: technical sophistication.
Just look at Bob Zubrin's vision of Mars colonization. Nowhere in Zubrin's books is there the kind of detailed engineering design for Mars colonies that the O'Neillians produced for their L-5 colonies. The problems of sustaining human life on Mars are dismissed after superficial discussions devoid of any hard numbers.
And there are obvious problems with colonizing Mars. The first one is that it gets incredibly cold there - probably down to -130C on winter nights. Every robot Mars probe has used small slugs of Pu-238 to keep its batteries from freezing at night.
And there is air on Mars - not enough to breathe, but enough to conduct heat. The Martian regolith will not be the perfect insulator that the Moon's is. Thermal control on Mars will not be simply a matter of adding layers of aluminum foil to reflect the sun. Bases and rovers will need to be insulated and heated. And how do you keep a human in a spacesuit warm in this climate?
And Mars has permafrost - at least in some places and those places are the ones to colonize. How do we keep the heat leaking out from our habitat or farm greenhouse into the ground from heating up the ice and melting or subliming it away? This is a severe problem in permafrost areas of the Earth - how bad will it be on Mars? Zubrin even proposes underground habitats. These will be in direct contact with the cold subsoil or bedrock which will suck heat out at a rapid rate.
If Gerard O'Neill was still alive and advocating Mars colonies, he would be doing some basic thermal transfer calculations to see how bad the Martian cold problem really is. He would be figuring out how big a fission reactor to send along to keep the colony warm and how often its core will need to be replenished by fresh U-235 from Earth. He would even have a rough number for the amount of Pu-238 everyone will have to carry in their spacesuit backpacks.
Bob Zubrin is perfectly competent to do these calculations since he has a Ph.D. in nuclear engineering. But you never see this kind of hard engineering analysis from the Mars Society. Instead, we get propaganda stunts like the Devon Island "Mars Base" which is only manned during the peak of the Arctic summer when the climate is tropical compared with that of Mars. Another thing you never see from the Mars Society is a realistic discussion of what would happen to the human body in the low Martian gravity. Zubrin has discussed at length the need for artificial spin gravity on the 6 month trip to Mars. But he assumes that the problem ends once the astronauts land on Mars. The problem of bone loss in a 0.38g field on Mars for ~18 months is completely ignored. When I read Zubrin's book The Case For Mars, I was so intrigued by this surprising omission that I consulted a friend who is a space medic at JSC. He tells me that this issue was once discussed at a conference of medical doctors who had actually worked with the long-term residents of Mir and ISS. NONE of these experts thought that humans could adapt permanently to Mars gravity!

No Space Colonization – No Interest

The US won't go to space—Lack of human interest and funding prevents travel
Hobby Space 2005 ("Solar Sci-Fi," January 25, http://www.hobbyspace.com/SolarSciFi/essay.html)

A paradox of the post-Moon Race era is that while interest and support of the U.S. public for space exploration collapsed, the popularity of space-based science fiction literally sky-rocketed. Star Trek, Star Wars, Close Encounters of Third Kind, ET, and other such movie and television space adventures have enjoyed huge success since the early 1970's, when, ironically, the Apollo project ended without a follow-on program of lunar development and Mars exploration. Polls continue to show little support for an ambitious space program and NASA's budget has fallen to a quarter of it's high in the 1960s. Even among many hard-core sci-fi addicts and Trekkers, the interest in current space exploration is remarkably low.
A number of reasons for this come to mind: Space travel in Sci-fi is easy and cheap. The Enterprise can take hundreds of people to another star as easily as a 747 goes from New York to London. An Apollo Moonshot, on the other hand, cost hundreds of millions of dollars to send three people to the moon in a small, cramped pod, which was the only thing leftover from a skyskraper tall rocket.
It is difficult to picture oneself ever riding in a small capsule on top of a throw-away missile while it's easy to imagine walking on the roomy bridge of the Enterprise. The huge costs seemed extravagent during a period of so much economic and social turmoil in the US. Sci-Fi adventures cost only the price of a theater ticket or were free on the tube. The Space Shuttle was disappointingly expensive and complicated, involving thousands of support staff to fly only a few times a year. Hardly the DC-3 of space as promised.
Space Sci-Fi usually involves faster-than-light travel that makes accessable a whole galaxy of amazing planets and alien civilizations. Meanwhile, our unmanned planetary explorers showed a solar system of cratered, desolate, and seemingly lifeless worlds with little appeal.

Colonization of space won't happen—General biases and lack of political funding prevent efforts
Britt, Senior Space Writer, **2001** (Robert Roy, "Survival of the Elitist: BIoterrorism May Spur Space Colonies," October 30, http://www.space.com/scienceastronomy/generalscience/)

Yet Hawking's comments come at a time when plans are already being discussed to create a modern Noah's Ark to escape the planet and preserve humanity. Saving yourself or protecting your progeny, however, will not come cheap.
One idea for an Ark is actually called ARC, for the Alliance to Rescue Civilization. And if it flies, everything from DNA to important architectural drawings would make their way to the Moon, a futuristic spaceport, or some other safe haven. A select group of individuals would go, too, to maintain the monumental archive and to round out, with live bodies, what is billed as a way to save civilization no matter what happens on Earth.
It's the sort of scheme that since the dawn of the nuclear age has driven the desire to colonize space.
Yet the desire has long been scoffed at, generating what proponents acknowledge as a significant societal giggle factor tied to the sci-fi images conjured by such an endeavor. These proponents have fought an uphill political and financial battle to get the notion of sending humans beyond Earth orbit back on NASA's agenda. They have yet to succeed. The space agency has no firm plans to send astronauts beyond the International Space Station. So in recent years, many of the movement's most vocal supporters have given up on NASA. Private enterprise is the only hope, they say, and the almighty dollar will drive any serious effort to put people on the Moon,

Space Colonization Impossible – Technically Infeasible

Space colonization isn't possible—Advocates fail to consider practical technical and financial issues
Bell, former space scientist and Adjunct Professor for Planetary Science at the Hawai'i Institute of Geophysics & Planetology at the University of Hawaii, **2005** (Jeffrey F., "The Dream Palace of the Space Cadets," Nov.25, http://www.spacedaily.com/news/oped-05zzb.html)

Actually, I wasn't laughing then. I never laugh while reading foolish online discussions about space. My reaction is intense frustration. It is frustrating to find that many Space Cadets are shockingly ignorant about space technology - and even more frustrating that the average level of ignorance seems to get worse with every passing year.
On the face of it this makes no sense. The first thing you do when you become obsessed with something is study it obsessively, right? And 21st century Space Cadets don't have to plow through yellowing books in college engineering libraries like I did in the 1970s - today the basic facts are there at web sites run by people like Mark Wade and Marcus Lindroos who make extraordinary efforts to dig out obscure information. But for years now, I have been meeting people who are both wildly enthusiastic about space travel as a broad intellectual concept and completely ignorant of the practical details. They don't know how rocket engines work. They don't know the basics of orbital mechanics. They don't know the facts (or the uncertainties) about the dangers of radiation and microgravity. Even worse, they have no idea how much space travel costs, or how these costs compare to other areas of human activity like war or mountain-climbing. They think that Will is all you need to colonize the solar system- they have no concept of the political, financial, and technological investment that it would take. But the small fraction of the pro-space community I meet in person seems tame compared to the internet space chat community. One regularly finds long discussion threads on politically impossible ideas like a one-way Mars suicide mission, financially impossible ideas like building spaceships on the Moon, and technically impossible ideas like ion-powered space blimps. In all these discussions, the few informed people who try to point out the massive problems with these ideas are swamped by a much larger number of enthusiasts who clearly don't know enough basic science or engineering to even understand the issues. I get even more frustrated when I visit the web sites of the various space advocacy groups. They are a pale shadow of the L-5 Society and the Space Studies Institute (both of which I joined in the 1970s). Many of these organizations seem to live in a dream palace of their own creation that has no relationship to the real world at all.

Space Colonization Impossible – Bone/Muscle Loss

Space travel causes bone, muscle, and cardiovascular deterioration through exposure to microgravity
CNN 2000
("The Science of the International Space Station," December 26, http://archives.cnn.com/2000/TECH/space/12/26/part.two/index.html)

One of the priorities for NASA is to use the ISS to study what microgravity does to people. Four decades of human space travel show that it weakens the bones, the muscles and even the cardiovascular system. Some astronauts experience nausea or have trouble sleeping. Uri says the goal of this new research is to find ways to make space a friendlier place to live. "Some of the earlier things we're going to be studying is understanding the mechanisms of how those changes actually occur," he says. "So far we've observed what the changes are and now we need to know what the mechanisms are so we can develop counter measures to prevent those changes."

Space travel leads to extensive muscle atrophy and bone deterioration in reduced-gravity environments – counter-measures can't solve
Potember, Bryden, and Shapiro, Researchers for the Applied Physics Laboratory at Johns Hopkins University, **2001** (Dr. Richard S., Dr. Wayne A., and Dr. Jay R., "Analysis of bone metabolism biomarkers and countermeasures using time of flight mass spectrometry,"

Exposure to reduced gravity during space travel profoundly alters the loads placed on bone and muscle. Astronauts lose muscle mass and strength while in space. Exercise countermeasures are so important that other activities may not be given enough time. The data from humans in space indicates a very rapid atrophy of skeletal muscle. After 5- day flights, mean cross-sectional areas of muscle fibers were 11 and 24% smaller in type I and II fibers. These changes occurred even though countermeasures were undertaken by astronauts.
There is a need to measure pharmacological, hormonal and growth factor biomarkers and to develop in-depth knowledge of molecular mechanisms for complex interplay between muscle atrophy and bone demineralization. We are evaluating the technical feasibility for evaluating the following biomarkers by TOF-MS: growth hormone, insulin-like growth factors (IGF-I), glucocorticoids: cortisol (which may play a central role in the early stages of muscle atrophy), and 3-methylhistidine (breakdown product of muscle proteins). Exposure to microgravity rapidly leads to osteopenia due to increased bone resorption and decreased bone formation. Studies with Skylab and Russian crews demonstrated 1.0-1.6%/month mean losses of bone mass from the spine, femur, neck, and pelvis, increasing the risk of fracture. Also of concern is the lack of evidence that bone loss is fully reversible on return to earth. Progress in developing effective countermeasures to demineralization depends on increased understanding of how the complex biochemical systems that modulate bone turnover response to pharmacological and stress-induced interventions.

Space Colonization Impossible – Immunity/Disease

Space travel and exploration lead to decreased system immunity through stresses of spaceflight
NASA 2004 (Dolores Beasley and William Jeffs, Release 04-320, "Study Suggests Spaceflight May Decrease Human Immunity," September 29, http://www.nasa.gov/home/hqnews/2004/sep/HQ_04320_immunity.html)

A NASA-funded study has found the human body's ability to fight off disease may be decreased by spaceflight. The effect may even linger after an astronaut's return to Earth following long flights. In addition to the conditions experienced by astronauts in flight, the stresses experienced before launch and after landing also may contribute to a decrease in immunity. Results of the study were recently published in "Brain, Behavior, and Immunity." The results may help researchers better understand the affects of spaceflight on the human immune response. They may also provide new insights to ensure the health, safety and performance of International Space Station crewmembers and future spacefarers on extended missions. "Astronauts live and work in a relatively crowded and stressful environment," said Duane Pierson, the study's principal investigator and NASA Senior Microbiologist at Johnson Space Center, Houston. "Stresses integral to spaceflight can adversely affect astronaut health by impairing the human immune response. Our study suggests these effects may increase as mission duration and mission activity demands increase," he added.
The white blood cell count provides a clue to the presence of illness. The five main types of white cells work together to protect the body by fighting infection and attacking foreign material. The most prevalent white blood cells are called neutrophils.
From 1999 to 2002, scientists from NASA, Enterprise Advisory Services, Inc., of Houston, and the Boston University School of Medicine compared neutrophil functions in 25 astronauts. They made comparisons after five-day Space Shuttle missions and after nine to 11 day missions. Researchers found the number of neutrophils increased by 85 percent at landing compared to preflight levels. Healthy ground control subjects, who did not fly, exhibited no more than a two percent increase. Researchers also discovered functions performed by these cells, specifically ingestion and destruction of microorganisms, are affected by factors associated with spaceflight. The effect becomes more pronounced during longer missions. The increase in astronaut neutrophil numbers resulted in a corresponding increase (more than 50 percent) in total white blood cell counts at landing. The increase is a consistent consequence of stress.
Pierson emphasized that "no astronauts in the study became ill; however, longer exploration missions may result in clinical manifestations of decreased immune response." Researchers concluded the general effect of spaceflight, pre- and post flight-related stress decreases the ability of crewmembers' neutrophils to destroy microbial invaders. This finding suggests crewmembers returning from longer missions may be briefly more susceptible to infections than before launch, because these cells are not as efficient in ingesting and destroying infectious agents.

Space travel increases risk for AIDS and cancer through immunodeficiency risks
Sastry, assistant professor of experimental veterinary pathology, **2001** (Dr. Jaqannadha K., Texas Medical Center News (Ronda Wendler), "Studies on Cell-Mediated Immunity Against Immune Disorders," http://www.tmc.edu/tmcnews/10_15_01/page_02.html)

Space travel can cause reduced immunity which leads to increased risk for infections. Immunodeficiency is also the basis for several cancers and AIDS. This project applied the ground-based microgravity technology developed by NASA to help understand immune disorders such as cancer and AIDS. This line of study may eventually help in the design of treatments and vaccines for these conditions.

Space harbors deadly viruses in the debris streams of comets
Britt, Senior Space Writer**, 2000** (Robert Roy, "Germs from Outer Space! Researchers Say Flu Bugs Rain Down from Beyond," January 21, http://www.space.com/scienceastronomy/planetearth/flu_in_space_000121.html)

Maybe not. It could be that increasingly frequent sunspots are driving the virus out of the stratosphere and into your body.So say Sir Fred Hoyle and Chandra Wickramasinghe of the University of Wales at Cardiff. And while there is much doubt by many other scientists that the flu comes from space, Hoyle and Wickramasinghe are generating a lot of interest with their idea.
In a new paper, to be published in an upcoming issue of the Indian journal Current Science, the researchers present data that show how previous periods of high sunspot activity coincided with flu pandemics (large-scale epidemics). A roughly 11-year cycle of solar activity is increasing now and is expected to peak soon, other scientists agree. Hoyle and Wickramasinghe say we can expect another flu pandemic to accompany the solar peak "within weeks." By that claim, perhaps debate over their research will soon be settled. Injecting the flu into our atmosphere The researchers say that the virus, or a trigger that causes it, is deposited throughout space by dust in the debris stream of comets, which are thought by many researchers to harbor organic material. As Earth passes through the stream, dust (and perhaps the virus) enters our atmosphere, where it can lodge for two decades or more, until gravity pulls it down.

Space Colonization Impossible – No Inter-Stellar Travel

Dangerous particles of dust and backwards travel prevent faster-than-light travel
BBC 2001
(“Travelling to the Stars: Faster-than-Light-Travel,” January 19, http://www.bbc.co.uk/dna/h2g2/A505630)

All of the above technologies could either practically or theoretically accelerate spacecraft to enormous speeds. However a constraint exists. Nothing can travel faster than light in a vacuum. Even if it was possible to travel at the speed of light, it could still take hundreds of years to reach even relatively close stars. We might also start to travel backwards in time. A scary prospect for some. For the time being, faster-than-light travel remains in the realms of fiction.
Making craft go faster will reduce the time required greatly, but the risks will increase. You don't even want to hit a tiny, microscopic particle of dust when travelling at a few million kilometres per hour, not to mention an asteroid. Particle detection mechanisms will have to be very sophisticated indeed.

Inability to travel faster than light makes space colonization impossible—travel to habitable planets will take centuries
ISTF no date given (Innovative Technologies from Science Fiction, “Colonization of Space,” http://www.itsf.org/brochure/longduration.html)

As we too often forget, the marvels of science used in science-fiction stories are not limited to the domains of physics or technology, but also include products of life science. As an example, imagine mankind has finally located the ready-to-colonize, Earth-like planet it has always dreamed of. This planet is orbiting a nice little star, a bunch of light years away from our blue planet. The interstellar ship is ready, but there is just one little problem. As faster-than-light travel is not available in this not so hypothetical universe, the trip will take between fifty and one hundred years. The members of the crew will be more than eighty when they reach their destination. Life science can easily solve this first problem by giving human beings a longer life expectancy.
However, even a science-fiction writer would not dare to imagine that the small crew would remain sane after spending a century crammed into a space ship cruising in the middle of nowhere. Once more, life science comes to the rescue. As in the novels "2001: A Space Odyssey" (Arthur C. Clarke) or "The Legacy of Heorot" (Larry Niven, Jerry Pournelle and Steven Barnes), the crew can be put into hibernation or frozen sleep until they reach their destination. In addition to the crew, the frozen cargo of the ship will also include all the plants and animals (embryos) that will be necessary for these new settlers to set up their colony.

Extensions: Faster Than Light Travel Impossible

Faster-than-light travel is impossible—violates the theory of causality
Hinson, Research Analyst at the Center for Naval Analysis**, 2003**
(Jason W., "Relativity and FTL Travel," April 3, http://www.faqs.org/faqs/star-trek/relativity_FTL/part4/)

Chapter 8: The Second Problem: FTL, Causality, and Unsolvable Paradoxes
In this section we will explore a problem with FTL travel that doesn't always seem to get consideration. The problem involves ones ability to violate causality in certain frames of reference with the use of FTL travel. While this in itself doesn't necessarily make FTL travel impossible, the ability to go further and produce an unsolvable paradox would make the FTLtravel prospect logically self contradictory. So, I will start by discussing the meaning of causality and the problems of an unsolvable paradox. I will then try to show how any form of FTL travel will produce violation of the causality principle. Finally, I will explain how, without special provisions being in place, FTL travel can go further to produce an unsolvable paradox.
8.1 What is Meant Here by Causality and Unsolvable Paradoxes The principle of causality is fairly straight forward. According to causality, if there is some effect which is produced by some cause, then the cause must precede the effect. So, if for some observer (in some frame of reference) an effect truly happens before its cause occurs, then causality is violated for that observer. Now, recall our discussion in Section 1.1 concerning when occurrences happen in a frame of reference. There I took a moment to explain that when I talk about the order of events in some frame of reference, I mean their actual order, and not necessarily the order in which they are seen. One can imagine a situation whereby I could first receive light from the effect and later receive light from the cause. However, This might be because the effect is simply much closer to me than the cause (so that light takes less time to travel from the effect I observer, and I see it first). After I take into account the time it took the light to travel from each event, then I will find the order in which the events truly occurred, and this will determine whether or not there is a true violation of causality in my frame. This true violation of causality is what I will be talking about, NOT some trick concerning when observers see events, but a concept concerning the actual order of the events in some frame of reference.
Now, one can argue that the idea of causality violation doesn't necessarily destroy logic. The idea seems odd--to have an effect come first, and then have the cause occur--but it doesn't have to produce a self-contradictory situation. An unsolvable paradox, however, is a self-contradictory situation. It is a situation which logically forbids itself from being. Thus, when one shows that a particular set of circumstances allows for an unsolvable paradox, then one can argue that those circumstances must logically be impossible.

Faster-than-light space travel is impossible—it violates the theory of special relativity
Wired News 2003
(Brian McWilliams, "Clark Campaigns at Light Speed," September 30, http://www.wired.com/news/politics/1,60629-0.html)

Gary Melnick, a senior astrophysicist at the Harvard-Smithsonian Center for Astrophysics, said Clark's faith in the possibility of faster-than-light, or FTL, travel was "probably based more on his imagination than on physics."
While Clark's belief may stem from his knowledge of sophisticated military projects, there's no evidence to suggest that humans can exceed the speed of light, said Melnick. In fact, considerable evidence posits that FTL travel is impossible, he said.
"Even if Clark becomes president, I doubt it would be within his powers to repeal the powers of physics," said Melnick, whose research has focused on interstellar clouds and the formation of stars and planets.
Einstein's theory of special relativity says that time slows down as an object approaches the speed of light. Some scientists say that FTL travel therefore implies time travel, or being able to travel to the future or the past.

Space Colonization Impossible – A2: Terraforming

Terraforming will fail—takes too long for air to be breathable by humans
Zubrin, aerospace engineer and president of the Mars Society and Pioneer Astronautics, **1997** (Robert, "The Economic Viability of Mars Colonization," http://www.aleph.se/Trans/Tech/Space/mars.html)

Nevertheless, Mars will not be considered fully terraformed until its air is breathable by humans. Assuming complete coverage of the planet with photosynthetic plants, it would take about a millennia to put the 120 mbar of oxygen in Mars' atmosphere needed to support human respiration in the open. It is therefore anticipated that human terraformers would accelerate the oxygenation process by artificial technological approaches yet to be determined, with the two leading concepts being those based on either macroengineering (i.e. direct employment of very large scale energy systems such as terrawatt sized fusion reactors, huge space-based reflectors or lasers, etc.) or self reproducing machines, such as Turing machines or nanotechnology. Since such systems are well outside current engineering knowledge it is difficult to provide any useful estimate of how quickly they could complete the terraforming job. However in the case of self-replicating machines the ultimate source of power would be solar, and this provides the basis for an upper bound to system performance. Assuming the whole planet is covered with machines converting sunlight to electricity at 30% efficiency, and all this energy is applied to releasing oxygen from metallic oxides, a 120 mbar oxygen atmosphere could be created in about 30 years.

Space Colonization Imopssible – A2: O'Neill/Floating Colonies

Floating colonies are a joke – they can't happen
Bell, former space scientist and Adjunct Professor for Planetary Science at the Hawai'i Institute of Geophysics & Planetology at the University of Hawaii**, 2005** (Jeffrey F., "The Dream Palace of the Space Cadets," Nov.25, http://www.spacedaily.com/news/oped-05zzb.html)

Back in the 1970s, you never saw this misleading and emotive propaganda image. It was clearly understood back then that permanent colonization of the Moon was impossible due to the debilitating effects of low gravity (which had just then been discovered on the early space stations Skylab and Salyut). This was a major reason that Gerard O'Neill developed the concept of free-floating space habitats with normal gravity provided by rotation. O'Neill was always quite clear that in his vision the Moon was just a strip mine with temporary crews working short shifts.
But there was a problem with those free-floating rotating habitats that became obvious as serious design studies were done: They were impossibly expensive to build. They required the lifting of vast tonnages of raw material from the Moon or the Belt and vast fabrication facilities. They required big construction crews that had to be housed, fed, and sent home to Earth before their bones melted away.
Pretty soon there were several generations of "construction shacks" and "initial colonies" in the O'Neill program. It would clearly be decades before any ordinary families would be living in space. The whole Vision faded away as the real costs and problems of the rotating 1-g space habitat became apparent.
So it isn't any surprise that today's space settlement advocates have drifted back to the 1950s vision of living on the surfaces of the planets. Superficially, it looks easier. The initial capital investment can be much less. There is no need to lift massive amounts of material out of a gravity well. You can imagine a few hardy pioneers digging their own shelters and gradually expanding an initial small foothold into a town.

Space Colonization Impossible – A2: Robots Solve

Technology does not help with space exploration—it's empirically proven that tech programs are too costly and ineffective
Robertson, freelance space industry journalist**, 2006** (Donald F., "Space Exploration: A Reality Check," March 6, http://www.space.com/spacenews/archive06/RobertsonOpEd_030606.html)

The second assumption is that we can conduct detailed exploration with robots, without personal risk or people on site. Recent events should engender some humility in our toolmakers. In spite of all the money spent on space robotics and some extraordinary successes like the Mars Exploration Rovers, we have failed to reliably automate even relatively simple tasks. Docking two spacecraft together would seem an ideal job for automation, but recent experiments such as the Demonstration of Autonomous Rendezvous Technology have not gone well. The Russian masters of this skill keep well-trained cosmonauts in reserve at the space station whenever possible, and they have to take over with depressing regularity. If we cannot reliably automate docking in Earth orbit, what makes us think we can do so at Mars as part of an expensive effort to return a few small samples? We recently learned it would cost at least as much to automate the repair of the Hubble Space Telescope, with a lower chance of success, than to do so with astronauts — even when the latter used the expensive space shuttle. Closer to home, an Air Force audit recently discovered, contrary to expectations, that it costs more to run automated spy planes than it does the human-piloted variety. We cannot cheaply or reliably automate the use and repair of well-understood nearby machines, with known interfaces between parts and tools. Why do we think a robot could, say, find a fossil on the rugged, random and largely unknown landscape of Mars? Finding a fossil on Earth requires scouting wide areas for likely rocks. You must hold and handle many thousands of oddly shaped samples of different size and weight, and with differing cohesions and textures; and observe all of them from any angle and at any scale. It also involves being able to cleanly cut samples of many sizes along any axis; examining each cut at a wide range of scales and wavelengths; and doing sophisticated on-the-fly pattern recognition to recognize any fossil. No foreseeable robot, at any cost, will be able to simultaneously handle any combination of these tasks. A single geologist with a limited set of tools can quickly do them all. Finding the second fossil will be no easier, nor will the third or fourth; then we need to study their distribution, and their positions within layers of accurately dated rock up to kilometers deep, to determine the fossil's age and history. It is barely conceivable we could automate the detection of life on Mars. Understanding any life, or ruling out life's existence, requires scientists on site. Many of the same issues apply when attempting to understand the fine-scale layering and dating of lunar volcanic flows or Martian sediments.Our rovers' accomplishments on Mars are remarkable and exciting, but let's not lose perspective and inflate their achievements. The rover project has spent more than two Earth years and well over $1 billion traveling less distance than human geologists could walk in an afternoon. The rovers helped us discover that, at some undetermined date in the past, there was standing water on Mars. It is no disrespect to one of the great accomplishments of our age to point out that this is basic reconnaissance with precious little science.

A2: Space Colonization Solves Existential Threats

Space colonization advocates construct false scenarios of apocalypse—Extinction from viruses won't occur
Britt, Senior Space Writer**, 2001** (Robert Roy, "Survival of the Elitist: BIoterrorism May Spur Space Colonies," October 30, http://www.space.com/scienceastronomy/generalscience/)

Are we doomed? Many scientists argue that there is no need to worry about the mortality of civilization right now. Eric Croddy is an expert on chemical and biological weapons at the Monterey Institute of International Studies. Croddy said the threat of a virus wiping out the entire human species is simply not real. Even the most horrific virus outbreak in history, the 1918 Spanish Flu epidemic that killed between 20 million and 40 million people, including hundreds of thousands in the United States, eventually stopped. Experts say new strains of the influenza virus emerge every few decades and catch the human immune system unprepared, but prevention measures and ever-evolving medical treatments overcome the outbreaks.
"I'd be much more concerned about an asteroid hitting the planet," Croddy said. Croddy accused Hawking of speaking more from a religious, apocalyptic view than from anything based on the facts of science.
"What he said is more biblical than scientific," Croddy said. Besides, he added, "Earth's not such a bad place." Most space-colonization enthusiasts share this planet with Croddy, as well as his view of it. But whether stated or not, the desire to ensure survival has always permeated their plans.

A2: Space Colonization Key To Immortality

Immortality would allow humans to destroy the environment

Stephens, author of *The Preparation: Space Colonization*, space and transhumanism expert, **no date given** (Rex, "Immortality for sale," http://www.thepreparation.com/Chap1.html)

Unplanned for immortality will be an disaster. Unplanned for immortality for the masses would create a world in which society is stratified with no turn over of wealth or power. Those near the top will refuse to let anyone beneath them move up because the only place they themselves can go is down, since the people above them won't let them move up either. It would only be a matter of time before this stratified society self-destructed.
Natural resources would also be negatively affected by immortality. For example the ownership of land. It would eventually become almost unthinkable for an immortal to sell his/her land. Land will be the best investment of all as the world`s population increases exponentially as a direct result of human immortality. Not only will people not be dying as fast as they are now but will also be at child bearing age the rest of their unnatural life. So if you own a small piece of land you will be assured a place to live.
If you own a lot of land you will be assured a lot of income from renting it to people who don't have any choice but to rent, because there will be no affordable land for sale. Even when land becomes available though the death or financial needs of the land owner it will cost dearly. You will have to provide an enormous down payment and expect to work the next 100 years of your life just to pay the mortgage.
Compounding this increased demand for natural resources will be the full scale industrialization of what are now third world nations. Today the industrialized nations of the world consume most of the Earth's resources even though they have only about one quarter of the Earth's population. Soon, the third world's demand for natural resources will exceed that of the industrialized world as their standard of living catches and then surpasses the standard of living now realized by the industrialized nations.
The Earth's ecosystem is already being destroyed by humanity's demands upon it. As these demands increase in the near future, a mass extinction event of unprecedented proportions is becoming more and more likely. Who among you doubts that humans will continue to take what they want from the Earth's ecosystem, even though humans know it will drive species after species to extinction? Eventually the Earth will become a planet inhabited only by humans and plants and animals that serve human needs.>

Environmental collapse causes extinction

Diner – Judge Advocate General's Corps-**1994**
[Major David N., United States Army Military Law Review Winter, p. lexis]

By causing widespread extinctions, humans have artificially simplified many ecosystems. As biologic simplicity increases, so does the risk of ecosystem failure. The spreading Sahara Desert in Africa, and the dustbowl conditions of the 1930s in the United States are relatively mild examples of what might be expected if this trend continues. Theoretically, each new animal or plant extinction, with all its dimly perceived and intertwined affects, could cause total ecosystem collapse and human extinction. Each new extinction increases the risk of disaster. Like a mechanic removing, one by one, the rivets from an aircraft's wings, n80 mankind may be edging closer to the abyss.

A2: Space Colonization Inevitable

Space colonization is not inevitable—public biases against space travel prevent support and funding
The Space Review 2005 (Stephen Ashworth, "The mission, the business, and the tandem (part 1)," January 31, http://www.thespacereview.com/article/312/1)

How realistic is this model? If governments are to deliver sustainable progress in space, then at the very least the goal of interplanetary civilization will have to be deeply embedded in their institutional psyches—as deeply as, say, such goals as creating the welfare state, or defeating Hitler, or demonstrating falling unemployment and rising prosperity. At present, there is no sign of this happening. The intellectual ideal of civilization in space remains the special preserve of a minority of visionaries, rather than the popular passion of society as a whole. To politicians, manned spaceflight remains a hobby for rich countries, not part of their core business: pure exploration, not economic growth. Meanwhile, the space agencies are offering to spend large amounts of other people's money without submitting their work to the disciplines of either international competition or the commercial market.
Under these circumstances, the hope that the continuous application of sizeable government space budgets will lead incrementally and inevitably to permanent extraterrestrial settlements is very much a hostage to fortune. This hope is vulnerable to the kind of changing circumstances that closed off the potential of the Apollo-Saturn system for evolutionary growth and doomed it to cancellation (a winged flyback version of the Saturn first stage was designed, and lunar bases sketched out). It is vulnerable to the kind of bureaucratic inefficiency which wasted many tens of billions of dollars, rubles, and euros on the International Space Station, while gaining us no progress whatsoever towards making spaceflight more affordable or sustainable, whether through opening up the key extraterrestrial resources of asteroidal ice and solar power, or through making spaceflight accessible to the public at an economical price, or even through demonstrating artificial gravity or medical methods of adaptation to weightlessness.

Irony Bad

Irony is an insider's game of endless reifying – its liberatory potential is like a third world junta that overthrows the existing government to replace it with a stifling new tyranny of inaction
Wallace in '97
(David Foster, Professor of Creative Writing and English at Pomona College, "A Supposedly Fun Thing I'll Never Do Again", p. 66-68)

So then how have irony, irreverence, and rebellion come to be not liberating but enfeebling in the culture today's avant-garde tries to write about? One clue's to be found in the fact that irony is still around, bigger than ever after 30 long years as the dominant mode of hip expression. It's not a rhetorical mode that wears well. As Hyde (whom I pretty obviously like) puts it, "Irony has only emergency use. Carried over time, it is the voice of the trapped who have come to enjoy their cage:'32 This is because irony, entertaining as it is, serves an almost exclusively negative function. It's critical and destructive, a ground-clearing. Surely this is the way our postmodern fathers saw it. But irony's singularly unuseful when it comes to constructing anything to replace the hypocrisies it debunks. This is why Hyde seems right about persistent irony being tiresome. It is unmeaty. Even gifted ironists work best in sound bites. I find gifted ironists sort of wickedly fun to listen to at parties, but I always walk away feeling like I've had several radical surgical procedures. And as for actually driving cross-country with a gifted ironist, or sitting through a 300-page novel full of nothing but trendy sardonic exhaustion, one ends up feeling not only empty but somehow . . . oppressed.
Think, for a moment, of Third World rebels and coups. Third World rebels are great at exposing and overthrowing corrupt hypocritical regimes, but they seem noticeably less great at the mundane, non-negative task of then establishing a superior governing alternative. Victorious rebels, in fact, seem best at using their tough, cynical rebel-skills to avoid being rebelled against themselves — in other words, they just become better tyrants.
And make no mistake: irony tyrannizes us. The reason why our pervasive cultural irony is at once so powerful and so unsatisfying is that an ironist is impossible to pin down. All U.S. irony is based on an implicit "I don't really mean what I'm saying." So what does irony as a cultural norm mean to say? That it's impossible to mean what you say? That maybe it's too bad it's impossible, but wake up and smell the coffee already? Most likely, I think, today's irony ends up saying: "How totally banal of you to ask what I really mean." Anyone with the heretical gall to ask an ironist what he actually stands for ends up looking like an hysteric or a prig. And herein lies the oppressiveness of institutionalized irony, the too-successful rebel: the ability to interdict the question without attending to its subject is, when exercised, tyranny. It is the new junta, using the very tool that exposed its enemy to insulate itself.

Irony ghettoizes resistence movements – even if it holds out possibility of emancipation it risks reifies the dependence of alternative culture on contemporary norms
Duncombe in '97
(Stephen, Professor at the Gallatin School of New York University, "Notes From Underground: Zines and the Politics of Alternative Culture", p. 148)

But boundaries of inclusion are necessarily also boundaries of exclusion, and irony reinforces the ghettoization of the underground. Not only are the marketing creeps locked out, but as the irony gets thicker and thicker and the references become more and more obscure, so is anybody new "You're either on the bus, or you're off the bus," Tom Wolfe wrote about an earlier tribe of bohemians, and if you're off the bus — not understanding the mores and codes of subcultural meaning — it's very hard to find a way to get on in the first place.21
There is also another price paid for the irony that holds this community together and keeps outsiders out. Irony is negative. I don't mean this in a touchy-feely sense of "bad vibes" and all that, but in the way I've explained before. Irony can only work as negation of an already existing culture which it uses as a reference point. This relationship is complex, but the problem is simple: irony renders the underground's role and its zine voice that of a parasite. While criticizing the dominant culture obliquely through irony, the underground reaffirms its dependency on it.
Irony is not cynicism and a resigned acceptance of the way things are. It holds out the ideal that there might be something else on the other side of the reality it lampoons, and then leaves what that might be up to the reader. It's playful and fun. It's my preferred voice when I write for zines. Yet I sometimes fear that irony also keeps the underground forever living in a dominant world that it can see through, with ironic vision, but never escape.

Irony leads us into complacency – it substitutes for real activism
Goerlandt in '06
(Iannis, Professor at Ghent University, Critique, ""Put the Book Down and Slowly Walk Away": Irony and David Foster Wallace's Infinite Jest", Volume 47, Issue 3, Spring, Proquest)

Hutcheon also spots the possibility of complacency in irony:
irony becomes a kind of surrogate for actual resistance and opposition. Ironists have been accused of smugness before, [. . .] but this time it is the interpreter too who is not being let off the hook. Even worse, irony is seen by some to have become a cliché of contemporary culture, a "convention for establishing complicity," a "screen for bad faith" [. . .]. What was once an "avenue of dissent" is now seen as "a commodity in its own right" [. . .]. This position is usually articulated in terms of contrast: the "authentic" or "sincere" past

didn't think we had cards on that did you?

versus the ironic present of the "total" ironist [. . .] whose use of what is interpreted as a mode of "monadic relativism" [. . .] prevents taking any stand on any issue. (28)9

Irony Bad

An ethic of cynicism is utterly devastating for meaningful and productive politics – the lack of faith in social institutions renders us incapable of fighting existing power structures – the politics of truth and hope offers a superior alternative

Loeb in '99

(Paul Rogat, Associate Scholar at Seattle's Center for Ethical Research, "Soul of a Citizen: Living With Conviction in a Cynical Time", p. 78-84)

Cynicism takes the notion that every institution and every person is for sale, and enshrines it as an eternal truth. It insists that human motives are debased and always will be. Cynicism implies that no institutions, truths, or community bonds are worth fighting for.

A POOR SUBSTITUTE FOR HOPE

Cynicism wasn't always so disempowering. The first Cynics were a group of ancient Greek philosophers, most notably Diogenes, who caustically denounced the established culture of their time. Monklike ascetics who preached simplicity, self-discipline, and self-sufficiency, they offered a moral alternative to the empty materialism, legalism, and religious hypocrisy that had come to dominate Greek society. Back then, to be a Cynic meant to stand up for one's convictions.

To fully appreciate the corrosive effect of contemporary cynicism, imagine adopting the same approach toward our children, spouses, lovers, and friends that we often do toward public life. Pretend for a moment that instead of placing our trust in them, and forgiving their lapses and flaws, we greeted them with derision, suspicion, and indifference. How long would hope, love, or joy survive under those conditions? That's precisely the reason we resist cynicism in our personal relationships. We take chances on people, risking disappointment and heartbreak, so as to encourage their best qualities. Otherwise, decent relationships become impossible.

Cynicism in the public sphere is no less destructive. Take electoral politics, toward which our pessimism and contempt are more thoroughgoing than in any other aspect of American life. As National Education Association president Bob Chase worries, "We're coming dangerously close to believing that nothing is possible, except for a nation of corruption and greed. People in media and politics should be promoting integrity. But they give us a sense that everyone's on the take, that everyone's out for themselves, and that working for a larger common good is impossible."

Attitudes in the workplace aren't much better. We've come to expect an occupational culture in which meanness and insecurity prevail. "That's the way it is in the real world," we say, which means a world stripped of moral considerations. Even if we'd once hoped to tie our values to our jobs, too many of us now work just to survive, or to buy a few pleasures during our free time. Asked to account for the discrepancies between our private convictions and our economic roles, we respond, "I just work here." Or: "I'm only running a business." Or: "If I don't do it, someone else will." As Doonesbury's creator, Garry Trudeau, points out, this attitude paints a categorically bleak portrait of human existence, with no possibility of redemption: We end up believing that all businessmen and politicians are dishonest, all religious leaders charlatans, all reporters cheap-shot hacks, all social activists fools.

More and more, cynicism occupies the mental and psychological space we once reserved for hope—at least for the kind of hope that might inspire us to take public stands. Better to expect nothing, in this view, than to set ourselves up for certain disappointment. Yet this very detachment renders us impotent, and thus eternally cynical.

What's the alternative? It certainly isn't blind trust, which though less self-defeating and socially irresponsible than cynicism, is dangerous in its own right. I saw both during my three-year study of Washington State's Hanford nuclear complex, the largest in the world. Hanford's founding generation came in during World War II, producing the plutonium for the first atomic bomb (exploded in the New Mexico desert), as well as for the one that fell on Nagasaki, and later the raw materials for a quarter of all the atomic warheads in the world. They were proud of their work. The high school football team, the Richland Bombers, displayed a miniature mushroom cloud on its helmets, pep club banners, and school commencement programs. When a new test breeder reactor called the FFTF went on line, the town's largest church added "God bless the FFTF" to its list of daily prayers.

To me, nuclear work raised troubling moral questions: Han-ford's repeated releases of radioactive gases, some deliberate, have left a trail of cancers and related health problems in communities as far as two hundred miles downwind; Hanford waste tanks, in-tended to be temporary, have leached hundreds of thousands of gallons of radioactive liquids into the ground; bombs made with Hanford plutonium have risked the potential annihilation of our species.

First-generation workers avoided these questions, choosing in-stead to immerse themselves in their jobs, building a team spirit and taking pride in the ethic of invention. "I could just as easily have been working in a coal plant," said one. "Or making light-bulbs." "My job," explained another, "was to make the machines work." Ultimately, Hanford's founding generation passed moral responsibility to those they referred to as "the men who know best." In Washington, D.C., explained the Hanford engineers, were congressional leaders and Pentagon officials who'd studied whether the building of nuclear weapons was right or wrong. They trusted them, they said, to make that decision.

The notion that a small group of specialists has a better grasp of key national choices than ordinary people exemplifies the moral distancing mechanisms common among the generations of the 1940s and 1950s. When men and women who came of age during that period later stayed silent in the face of obvious social ills, they did so largely because of their faith in our government leaders, and their belief in technical progress. Both of these impulses were strengthened by the Second World War, when the United States pulled together to defeat a common enemy. Could the Allied forces have taken Omaha Beach on D-Day without a very large number of young men who were willing to place their fate in the hands of the generals, their representatives in Washington, and ultimately their president? I'm not sure. But I do know that this same trust also made it easier to excuse dangerous governmental and corporate actions in all sorts of contexts, from Hanford to Vietnam.

Our institutional faith today has eroded, in part because of repeated betrayals by individuals and institutions we once trusted. We no longer believe the men who say they know best. However, we also don't believe we can challenge their judgments. In a disturbing twist, a large number of Americans, convinced that the country is simply doomed to be run by greedy crooks, have responded by retreating into private life. How did we arrive at this grim juncture?

This familiar blend of inflated skepticism and pervasive resignation was evident in a new generation of workers that arrived at Hanford in the late ,1970s and early 1980s to build three new commercial reactors. (Only one of the plants limped to completion, saddling Pacific Northwest ratepayers with a multibillion-dollar debt load, greater than the national debt of Poland.) Unlike their older counterparts, most of these young men and women mistrusted the nuclear enterprise, but still showed up to build the plants every day. They cultivated an attitude of detachment, treating their work as an elaborate con game with an excellent pay-check.

"When these reactors go on line," several told me, "I'll be long gone—as far away as possible." One computer scientist whose world-weariness seemed particularly terminal joked, "Maybe the human species is like a company past its time—simply due for extinction."

Other young atomic workers rationalized their jobs by saying that since everyone else in the community accepted the reactors, they might as well accept them too, despite their personal qualms. "If this was somewhere else, where they didn't want these plants," said one, "I'd be the first to start protesting. But this is a nuclear town and it always will be."

"If I was back East and they were building reactors," said an-other, "I'd be throwing rocks, climbing fences, and getting arrested. Here, where else are you going to work? I tell you, I don't like that breeder, though, and when they start that sucker up I'm moving.

The young Hanford workers often voiced misgivings about the results of their labor and the process of their work. But they quickly brushed aside higher ideals like so much smoke from the high-priced dope they smoked. They joked about neophytes who bought their way into skilled jobs, underground pipes that led no-where, improper welds, and other shoddy practices with potentially catastrophic consequences. Then they laughed, shrugged, and said they might as well get the money, since someone was going to.

You might call them realists, if by realism you mean the ability to accept almost any situation without moral qualms. But no mat-ter how much Hanford's workers mistrusted their product, and regardless of any worries they had about the escalating stakes in the nuclear gamble, their occupational culture possessed no internal check that would stop them from going in day after day to help build reactors of questionable safety or weapons of mass destruction. As in industries with much less dramatic potential impact, the possibility of an alternative response wasn't part of their world.

"WON'T GET FOOLED AGAIN"

Since I first wrote about Hanford in the early 1980s, America's cynicism has grown more insidious. We've come to equate moral conviction with delusion, and mock those who dare act on their beliefs. "It's nice that you're idealistic," we respond. "But what makes you think it matters?"

In the judgment of the Princeton philosopher Robert Wuthnow, this dismissal has deep cultural roots. "In an individualistic society," he writes, "caring is sometimes seen as an abnormality... . We do not even believe in sharing too deeply in the suffering of others. Our individual autonomy is too important. If caring for others becomes too demanding . . . we call it an obsession."

Even if we believe in some core notions of right and wrong, we often portray the unjust structures of our time as immutable, and that produces a sense that they can never be changed. A "radical" political scientist once explained to me loftily, "We're fooling our-selves if we think government doesn't serve powerful economic interests." True enough, for the moment. But he framed this as an inevitable state, as if history were out of our hands. He gave his students no vision to fight for, no foundation for action, only the prospect of joining him in the ranks of the all-knowing witnesses to human folly.

Cultivated or crude, cynicism is treacherous. It converts the sense of not wanting to be lied to—conveyed in the classic Who song "Won't Get Fooled Again"—into bitter protection against dashed hopes: If we never begin to fight for our dreams, there's no risk that we will fail. We can challenge the notion of "the men who know best" with new information—examples of how the powers that be routinely mislead us. But what can possibly challenge an all-encompassing worldview that, in the guise of sophistication, promotes the bleakest possible perspective on the human condition—the notion that everyone lies? The answer requires giving citizens something to believe in, a vision of connection powerful enough to help us begin once again to trust our fellow human beings.

didn't think we had cards on that did you?

Irony Bad

Irony is a death sentence for emancipatory politics – there is nothing funny about the totalitarianism and paralysis that results from your ironic annihilation of alterity
Sardar in '97
(Ziauddin, Professor of Postcolonial Studies at City University of London, "Postmodernism and the Other: New Imperialism of Western Culture", p. 175)

This thesis, as Slavoj Zizek argues, has two basic flaws: First, this idea of an obsession with (a fanatical devotion to) Good turning into Evil masks the inverse experience, which is much more disquieting: how an obsessive, fanatical attachment to evil may in itself acquire the status of an ethical position, of a position which is not guided by our egotistical interests. [Second], what is really disturbing about The Name of the Rose, however, is the underlying belief in the liberating, anti-totalitarian force of laughter, of ironic distance. Our thesis here is almost the exact opposite of this underlying premise of Eco's novel: in contemporary societies, democratic or totalitarian, that cynical distance, laughter, irony, are, so to speak, part of the game. The ruling ideology is not meant to be taken seriously or literally. Perhaps the greatest danger for totalitarianism is people who take its ideology literally.
Irony thus can serve to maintain the status quo. What Rorty seems to be saying, and Eco trying to demonstrate in his novel, is 'laugh at bourgeois liberalism, it will ease the pain of finally accepting it'. But 'bourgeois liberalism' is no laughing matter for its victims: the non-west, the majority of mankind. Irony, ridicule and cynicism is what secularism used to undermine Christianity during the Enlightenment; now they have become weapons targeted at the non-west. Taken to its extremes irony and cynicism, as Peter Sloterdijk's classic work, Critique of Cynical Reason, demonstrates, produce nothing but paralysis, a sensibility which is 'well off and miserable at the same time', unable to function in the real world. Other cultures, therefore, have to take postmodern liberalism, with its deep moorings in the grand narrative of secularism, literally. In its eagerness to subsume Other worlds and push Other cultures towards a de-divinised world, postmodernism acquires a totalitarian character: with or without irony, postmodern bourgeois liberalism spells the death of the Other.

Irony's has no utility – it goes from debunking myths to stabilizing the oppressive status-quo
Wallace in '93
(David Foster, Professor of Creative Writing and English at Pomona College, Review of Contemporary Fiction, "An Interview With David Foster Wallace", Volume 13.2, Summer, http://www.centerforbookculture.org/interviews/interview_wallace.html)

Irony and cynicism were just what the U.S. hypocrisy of the fifties and sixties called for. That's what made the early postmodernists great artists. The great thing about irony is that it splits things apart, gets up above them so we can see the flaws and hypocrisies and duplicates. The virtuous always triumph? Ward Cleaver is the prototypical fifties father? "Sure." Sarcasm, parody, absurdism and irony are great ways to strip off stuff's mask and show the unpleasant reality behind it. The problem is that once the rules of art are debunked, and once the unpleasant realities the irony diagnoses are revealed and diagnosed, "then" what do we do? Irony's useful for debunking illusions, but most of the illusion-debunking in the U.S. has now been done and redone. Once everybody knows that equality of opportunity is bunk and Mike Brady's bunk and Just Say No is bunk, now what do we do? All we seem to want to do is keep ridiculing the stuff. Postmodern irony and cynicism's become an end in itself, a measure of hip sophistication and literary savvy. Few artists dare to try to talk about ways of working toward redeeming what's wrong, because they'll look sentimental and naive to all the weary ironists. Irony's gone from liberating to enslaving. There's some great essay somewhere that has a line about irony being the song of the prisoner who's come to love his cage.

Irony's refusal of mass political movements is its downfall – it carries huge risk of cooption by reactive politics
Bewes in '97
(Timothy, Assistant Professor of English at University of Sussex, "Cynicism and Postmodernity", p. 41)

There is a second, more obviously `dangerous' way in which irony functions as a kind of ideological sophistry. `The greatest advantage that irony gives to those who possess it [sic],' writes Toby Young, is `the ability to resist passionate political movements'. The extent to which irony, or laughter, might be harnessed by forces of political reaction is obvious. Slovenian critic Slavoj Zizek provides perhaps the most lucid account of this in the opening chapter of his The Sublime Object of Ideology. With reference to Peter Sloterdijk's distinction between `cynicism' and `kynicism', cynicism as irony, says Zizek, has replaced the classical Marxist notion of `false consciousness' as the dominant operational mode of ideology. The ruling ideology is no longer even meant to be taken seriously, according to Zizek. Irony as an end in itself represents the rapid commodification of a strategy that once provided a legitimate means of challenging the dominant ideology. Kynicism, by taking itself too seriously, becomes vulnerable to precisely its own critical processes — the moment when, as Sloterdijk says, `critique changes sides', and cynicism is perversely reconstituted as a "negation of the negation" of the official ideology'.66 Toby Young's version of irony is a psychic reification, a critique that no longer has an object, that exists solely and absurdly as an assertion of superiority over all conditions of representation. Since in principle nothing escapes its invective, enlightened cynicism is in effect a disabled critique that mistakes its own absence for a kind of universalized rigour.

Irony Bad – A2: Irony Solves Cooption Of Resistance

Don't believe the hype – irony is easily commodified
Duncombe in '97
(Stephen, Professor at the Gallatin School of New York University, "Notes From Underground: Zines and the Politics of Alternative Culture", p. 148)

Besides, the article of faith that critical irony cannot be co-opted by the commercial culture is a shaky one. Exactly how shaky was demonstrated in 1996 when Nike, the master of this game, added the song "Search and Destroy" to its sneaker ad lineup. The song, written in the early seventies by draft-dodging punk pioneer Iggy Stooge (aka Iggy Pop), was originally a mock celebration of the Vietnam War and American testosterone-driven culture. Reborn and stripped of any ironic message, "Search and Destroy" is now the soundtrack to a testosterone-driven basketball game and marketing strategy. I suppose it's only a matter of time until "Kill the Poor" sells Nikes too, most likely providing the musical backdrop to a scene of Nike-wearing ghetto kids playing aggressive b-ball.

Irony has become co-opted by material culture – it has no subversive potential
Kuspit in '04
(Donald, Professor of Art and Philosophy at University of Michigan, "Revising the Spiritual in Art", Presented at Ball State Unviersity, January 21, http://www.bsu.edu/web/jfillwalk/BrederKuspit/RevisitingSpiritual.html)

One of the reasons that Kandinsky was concerned with inner life is that it registers the pernicious emotional effects of outer materialistic life, affording a kind of critical perspective on materialism that becomes the springboard for emotional transcendence of it. The inability of Pop art to convey inner life, which is a consequence of its materialistic disbelief in interiority, and especially spirituality, which is the deepest interiority, indicates that Pop art's irony is at best nominally critical. Irony in fact mocks belief, even as it spices up materialism, making it seem less banal, that is, populist, thus giving Pop art the look of deviance characteristic of avant-garde art. In Pop art it is no more than a simulated effect. I dwell on irony because it is opposed to spirituality, not to say incommensurate with it, and also its supposedly more knowing alternative, and because irony has become the ruling desideratum of contemporary art, apparently redeeming its materialism. This itself is ironical, for contemporary materialistic society and its media have discovered the advantage of being ironical about themselves, namely, it spares them the serious trouble of having to change. This suggests that irony has become a form of frivolity. It is no longer the revolutionary debunking understanding it once claimed to be, e.g., in Jasper Johns's American flag paintings, but an expression of frustration.

Irony Bad – A2: Irony Negates Existing Culture

Irony is just a binary reversal – it lacks the emancipatory potential of total negation
Bernstein in '01

(Charles, Professor of English at University of Pennsylvania, "Content's Dream: Essays 1975-1984", p. 461-462)

My problem with irony is that it is a set-up in which the "real" meaning is the opposite of the surface meaning. X equals not X. It's just another binary system, like the ambiguity in a drawing of a duck that can also be read as a drawing of a rabbit. It's the difference between a double entendre and Joycean word play. Irony is simple ambiguity: ironic/iconic. What I want is humor that opens out into a multivolitional field destabilizing to any fixed meaning that can be assigned and that persists out of context. Octavio Paz has used the term "meta-irony": "an irony that destroys its negation and, hence, returns in the affirmative." But I wouldn't want to stop at that flip back to the affirmative but to go beyond yes and no. Humor as destabilizing not only the negation to mean affirmation but the affirmation also--the idea of a perpetual motion machine that never stops pinging and ponging off the walls, ceilings, floors. So returns to . . . let's say "the absolute", maybe the ineffable--everywhere said, nowhere stated. But then I wouldn't want to make humor into too serious a business.

A2: Give The Land Back – Frontline

Europeans were here first – they occupied the land prior to descendents of modern Indians which negates the moral posturing and mythology of Indian nativity
National Review in '01
(John J. Miller, "Roots-Deep Ones: The perils of looking into American prehistory", June 25, L/N)

Despite the uncertainty, it has become increasingly clear over the last decade that the history-textbook version of ancient American settlement no longer holds up. The first Americans, according to the standard view, arrived about 12,000 years ago by way of a land bridge that once connected Siberia and Alaska. Thanks to a handful of sites like Cactus Hill, it is now beyond dispute that some people got here much earlier. Asia remains a likely source for migrations, because of its proximity and the fact that today's Indians indisputably have ancestors who lived there. But Asia may not be the only source, and there's good reason to think it wasn't.

This ought to be thrilling news for the multiculturalists. What better project for them than the serious study of America's prehistory-a glorious mosaic whose rich diversity is only now seeing daylight? But it must be remembered that multiculturalism is motivated not by sincere curiosity about the past, but by the sensitivities of modern victimology. An important part of American Indian identity relies on the belief that, in some fundamental way, they were here first. They are indigenous, they are Native, and they make an important moral claim on the national conscience for this very reason. Yet if some population came before them-perhaps a group their own ancestors wiped out through war and disease, in an eerily reversed foreshadowing of the contact Columbus introduced-then a vital piece of their mythologizing suffers a serious blow. This revised history drastically undercuts the posturing occasioned by the 500th anniversary of Columbus's 1492 voyage.

The prime mover behind the European-migration theory is Dennis Stanford, a jovial anthropologist who has spent nearly three decades at the Smithsonian Institution studying Stone Age technology. A big table dominates his office in the National Museum of Natural History, and it's often cluttered with primitive tools borrowed from the Smithsonian's huge collection. He is an authority on Clovis Culture, named for the town in New Mexico where the first remnants of it were found in 1932. The Clovis people were said to be big-game hunters who stalked mammoths, and they left behind distinctive relics. Researchers were so sure that they were the continent's original settlers-about 12,000 years ago-that suggesting otherwise was professional heresy.

But by the late 1980s, Stanford and a few of his colleagues, including his former student Bruce Bradley, began to harbor serious doubts about the Clovis theory. For starters, there were a handful of sites, such as Pennsylvania's Meadowcroft Rockshelter, that seemed older than Clovis. But more important, in Stanford's view, was the complete lack of evidence that Clovis culture ever existed outside the Americas. He spent years scouring museum collections around the world, but always came away empty. "It was getting pretty discouraging," he says.

In truth, there is a Stone Age technology that looks an awful lot like Clovis, and its existence troubled Stanford and Bradley: The culture that produced it wasn't found in Siberia, where just about everybody would have expected it, but at the other end of the same landmass-in modern-day France and Spain. It's called Solutrean, and it vanished some 20,000 years ago. Stanford and Bradley were especially intrigued by the fact that the greatest concentration of Clovis sites occurs in the southeastern United States: If the technology is native to the Americas, it was probably invented in this area. If it wasn't native, then this was probably the site to which it was imported-on the side of the North American continent facing Europe. But a pair of insurmountable obstacles appeared to separate the Clovis and Solutrean cultures: several thousand years, and a large ocean.

Then came the findings at Cactus Hill. "As soon as we started to see some of that stuff come out, we thought about the connection to Solutrean," says Stanford. Joseph McAvoy and his team found Clovis artifacts on the site, as well as irrefutably older material that Stanford and Bradley think is a developmental form of Clovis technology.

That's a groundbreaking observation. Experts in ancient technology like to build family trees. Just as a sculptor can hack a limitless number of objects out of a stone block, there are an infinite number of ways to chip a hand ax or spearpoint from a rock. Over time, cultures develop particular techniques; archaeologists can identify them and create tool genealogies. If they find tools that look similar and were manufactured in the same way, there's a good chance the people making them shared cultural traits. They may have been blood relatives or trading partners, but whatever their precise relationship, they almost certainly drew from the same storehouse of knowledge.

Stanford is one of the world's few remaining accomplished flintknappers: Give him the right type of rock and he can flake it into a long, bifacial, and fluted spearpoint just like a Clovis hunter would. While other scholars have noted the similarities between Clovis and Solutrean technology as a mildly interesting example of cultural convergence-in other words, a coincidence-Stanford's expertise in flintwork made him suspect a deeper connection: "There are so many matching steps in how they made their tools: bifacial flaking, heat treatment, similar ceremonial items, the presence of red ocher. There must be fifty or sixty points of comparison. It can't be chance." And yet nobody could figure out a way to bridge the thousands of years and miles dividing the two groups.

Then, in 1994, a team of Emory University scientists studying genetic diversity made an unexpected discovery. They examined a specific kind of DNA lineage known as mitochondrial DNA in ethnic groups around the world. Their survey of American Indians found four major varieties, which they labeled haplogroups A, B, C, and D. Each of these has antecedents in Asia, confirming that today's Indians descend almost entirely from Asian stock. But there's a fifth lineage, too, called haplogroup X. It occurs in about a quarter of all Ojibway Indians, and in lesser amounts among members of the Sioux, Navajo, and other tribes. A version of the X haplogroup shows up in only one other place on the planet: Europe.

"That's what pushed me over the edge," says Stanford. If the X haplogroup had found its way to America through Siberia, it almost certainly would have left behind a mark somewhere in Asia; but exhaustive searching has turned up no indications of any passage. The simplest explanation is an Atlantic crossing.

A2: Give The Land Back – Europeans Here First

Our argument is a slayer – the genocide process is backwards – white people from Europe were victims of Indian aggression – Caucasians should own the land

FrontPageMagazine.com in '99

(Lowell Ponte, Tal Radio Host, "Politically Incorrect Genocide, Part Two", October 5, http://www.frontpagemag.com/Articles/ReadArticle.asp?ID=2659)

COULD A FEW BONES require the re-writing of every American history textbook? Could they discredit the politically correct party line that we and our children have been taught for generations about Indian origins and European conquest in the New World? On September 21, a federal judge in Portland, Oregon, all but ordered a DNA test of these disputed relics. Such a test stands a good chance of proving that some of the first "Native Americans" had white skin and European ancestry. No wonder the Clinton Administration has moved heaven—and 500 tons of earth—to prevent a thorough scientific investigation of where one very old skeleton came from.

Two young men found a human skull while wading at the edge of the Columbia River near Kennewick, Washington, on July 28, 1996, and notified the Sheriff. Asked to investigate by the county coroner's office, anthropologist James Chatters found more bones in the shallow water. That required a permit from the Army Corps of Engineers, which has legal jurisdiction over navigable waterways such as the Columbia, and it promptly issued a retroactive permit to dig the site.

The bones seemed too old to be from someone who died recently, Chatters thought. They were discolored, and soil adhered to them as to bones buried for a century or more. At first Chatters guessed that they might be of some historic interest. Perhaps they were those of an Oregon Trail pioneer who came west by covered wagon.

But two surprising findings soon turned these remains into bones of contention. They are now part of the biggest political—and politically correct—tug of war since kings of Christendom fought over ownership of holy relics.

When bone fragments were sent for radiocarbon dating to the University of California at Riverside, analyst R. Ervin Taylor estimated that "Kennewick Man," as the skeleton was quickly dubbed, had lived 8,410 (plus or minus 60) years ago. This was "broadly corroborated" by part of a stone arrowhead still imbedded in the 5'10" man's pelvis. The arrowhead, experts said, dated from the "Cascade" phase of Indian history in the Pacific Northwest that happened 9,000 to 4,500 years ago.

But even more surprising was Dr. Chatters' analysis of the bones. The skull revealed that Kennewick Man had a long, narrow face, protruding nose, receding cheek bones, a high chin, and a square mandible. "None of these features is typical of modern American Indians," reported the journal Archeology in January/February 1997. Chatters' analysis, wrote New York Times reporter Timothy Egan, "adds credence to theories that some early inhabitants of North America came from European stock."

Some ancient paleoindians on the East Coast nine millennia ago exhibited skull features resembling Kennewick Man's. University of Washington anthropologist Donald K. Grayson objected to use of the term "Caucasoid" to describe the skeleton, calling it a "red flag, suggesting that whites were here earlier and Indians were here later, and there's absolutely no reason to think that."

But others were taking no chances that further analysis of Kennewick Man's bones or DNA might provide evidence and reason to believe that some of America's earliest settlers had white skins and European ancestry.

Five Indian tribes claimed ownership of the skeleton under the 1990 Native American Graves Protection and Repatriation Act (NAGPRA), which grants control of human remains to the tribe most likely to be their descendants or relatives. These tribes announced their intention to return Kennewick Man to Mother Earth by burial and to prevent any further religious or cultural affront such as DNA testing.

"Some scientists say that if this individual is not studied further, we, as Indians, will be destroying evidence of our own history," said Umatilla tribal religious leader Armand Minthorn. "We already know our history…. From our oral histories we know that our people have been part of this land since the beginning of time…." (Scientists theorize that the Mongoloid ancestors of Amerindians crossed the Bering Land Bridge from Asia sometime between 60,000 and 10,000 years ago, with different waves of migration bringing two different blood types.)

The Clinton Administration was also passionately interested in burying these bones and the revision of history they might require. No sooner had public discussion begun about whether Kennewick Man was Caucasian than the Army Corps of Engineers took and locked away the bones from scientists. ACE officials, however, allowed Indians access to the remains and indicated the government's intention to turn over the skeleton to Native Americans for reburial as soon as possible.

Dr. Doug Owsley, curator and division head for physical anthropology at the Smithsonian Institution's National Museum, along with seven other scientists, filed a lawsuit to prevent the government from turning the skeleton over to Indians and to seek research access to the remains. Available evidence suggests that Kennewick Man had no "cultural affiliation" with Indians, as NAGPRA requires. The closest thing to such an affiliation might have been the Indian arrowhead lodged painfully in this ancient man's hip bone. (To visit the Kennewick Man Virtual Interpretative center for links to news stories, documents, the text of NAGPRA, and much more, click here.)

The scientists' lawsuit has impeded the Clinton-desired cover-up of Kennewick Man. It also opened the way for transfer of more than 350 bone pieces to the University of Washington's Burke Museum in Seattle, where they remain under lock and key—or most do. Of a dozen femur bone pieces collected and recorded, as of January 1999, only two reportedly could still be accounted for. The rest have apparently been stolen in what Dr. Owsley called "a deliberate act of desecration."

But despite their loud protests, the scientists could not prevent another Clinton cover-up. On April 6, 1998, responding to a never-before-noticed urgent need to shore up one tiny spot along the banks of the Columbia River, the Army Corps of Engineers buried the site where Kennewick Man was found.At a cost to taxpayers of $160,000, the government dumped 500 tons of rock and dirt on the fragile archeological dig site and imbedded fiber blankets and other materials to prevent the river from washing its work away. It then thickly planted the spot with dogwood, willow, and cottonwood trees whose fast-spreading roots will make future archeological work there almost impossible.

Orders directly from the Clinton White House apparently prompted this anti-scientific vandalism. As journalist Mark Lasswell reported in the January 8 Wall Street Journal, even the Army Corps of Engineers in Walla Walla, Washington, acknowledges the "participation and interest at the Executive level" in the Kennewick Man controversy. The sudden decision to make further research at the Kennewick archeological site, a Corps spokesman said, was a "good faith" effort at "erosion control" to protect both Indian and scientist "sensitivities" (over the screamed objections of scientists) about safeguarding the site.

The Clinton Administration also opposed and defeated a bill by Congressman Richard "Doc" Hastings (R., WA), who represents Kennewick, that would have blunted NAGPRA regulation over the remains and opened scientific access to study them.

The Clinton Administration opposes the most basic precepts of open scientific inquiry in this matter. Some of the reasons why seem obvious. Suppose DNA analysis reveals that Kennewick Man's skin was not red or brown but white. Suppose excavation of the site uncovered artifacts that confirmed a cultural link to European ancestors.

It has been an article of faith among politically correct Leftists that in 1491, before that white devil Columbus reached the New World, this land was a utopia peopled by peaceful, sensitive, nature-worshipping people of color.

If DNA confirms what his bone structure suggests—that Kennewick Man may have European ancestry, or perhaps be related to the oppressed, ancient Caucasian-like Ainu people of Northern Japan—then the exclusive historic claim of colored people's priority in the New World goes Poof! and vanishes.

The long-cherished victim status of Native Americans would be weakened—or worse, reversed. Suppose an archeological dig at Kennewick revealed a whole community of people with Caucasian DNA? Suppose it found dozens or hundreds of Euro-American skeletons, most with Native American arrowheads in their backs, victims of a pogrom-like massacre?

If a Caucasoid Kennewick Man and his tribe roamed the Cascade rain-shadow dry interior of Washington State 9,000 years ago, we must then ask a painful question: what happened to them? Why did they vanish while Native American tribes took over the land that once was theirs? Did white-skinned early Americans lack the skill or luck to survive? Or were they killed off by darker-skinned invaders in an act we today would define as racism and genocide (especially if its victims were not of European ancestry)?

Such are the stakes that prompted President Clinton to carry out what could be called the biggest cover-up of his scandalous administration. If Kennewick Man is Caucasian, then white people, according to the racial politics Clinton has promoted, have as legitimate a right to be on American soil as do any people of color.

If evidence shows that white-skinned Americans were exterminated by invading ancestors of today's Indians, then this genocide could give Caucasian Americans a claim to victim status even stronger than that of Native Americans. Had such genocide not taken place, the argument would go, perhaps most of America's population and territory would have been Caucasian. Columbus might have been greeted by natives with faces whiter than his own.

History is written by the winners. Even the name "Kennewick" comes from Indian words meaning "winter heaven." On today's university campuses, the fashion is to depict Euro-Americans as evil and Native Americans and most Hispanics as the virtuous survivors of white colonial exploitation, rape, and genocide. Kennewick Man might prove the opposite—that the true Native Americans were white, victims of murderous genocide by the ancestors of today's Indians who seized their land. The European invasion of the past five centuries, in this potential revisionist history, merely reclaimed land stolen 9,000 years earlier from their murdered kin.

didn't think we had cards on that did you?

A2: Give The Land Back – Europeans Here First

Turn: We should owe the land – to Europe – European migrants were the first settlers
Chicago Tribune in '00
(Michael Kilian, "Europeans Possibly 1st Americans", April 6, http://malagigi.cddc.vt.edu/pipermail/lnc/2002-April/006180.html)

Just whom do you think you are, Mayflower descendents? The first Americans may have come over here on a boat, all right. But it was something like 20,000 years ago, and their last stop may have been Ireland. News of this finding, which will be presented to the Society for American Archeology in Philadelphia on Friday, has caused a considerable stir in the scientific community. The presentation will detail an archeological dig in rural Virginia that has produced evidence, such as tools and weapons similar to those used in Western Europe, that the "first Americans" may have been living on this continent several thousand years before scientists had thought. What's more, says Dennis Stanford, chairman of the anthropology department at the Smithsonian Institution's National Museum of Natural History, the Virginia findings confirm a belief that the earliest Americans came not by land bridge from Asia, but from Spain via Ireland. And, he says, it indicates civilization more likely spread throughout this continent from coastal communities in what is now the southeastern U.S. rather than from the Northwest. In other words, the first native Americans may have come from a Western European people who 20 millennia ago were in a mood to flee Ice Age-induced overcrowding. "The real question is, did they have boats or not?" said Stanford. "Why anyone would think they wouldn't, I find amazing, because we know boats go back 50,000 years." For decades, the earliest known habitation in North America was a site at Clovis, N.M., where archeologists uncovered tools and other artifacts of primitive culture that dated back about 13,500 years. In 1989, a team of archeologists sponsored by the Virginia Department of Historic Resources and the National Geographic Society began finding similar items at a site called Cactus Hill on the Nottoway River, south of Richmond. According to recent scientific testing, these objects date back to at least 1,000 years before the Clovis artifacts, and probably much earlier. "It's older than Clovis and could be as old as 18,000 to 20,000 years," said archeologist Joseph McAvoy, manager of the Cactus Hill team. Officially known as the Nottoway River Survey, the group's members include scientists from Yale University, the University of Washington, Appalachian State University and Virginia Tech. "Clovis is associated with a migration in the late Pleistocene Age where hunters supposedly came across the Bering Strait land bridge and entered central North America through a gap between the glaciers in about the center of the continent," McAvoy said. "Cactus Hill represents a very substantial data point of evidence in favor of the argument that there were people here before the mass migration of the Clovis hunters across North America." Stanford and others believe the Clovis hunters may have descended from the earlier Cactus Hill people, and that rudimentary civilization on the continent more logically spread from the Southeast, not the Northwest. And originated in Europe, not Asia. The dig in Virginia uncovered several layers of dirt, artifacts and civilization. At first, the team found tools common to people in the Clovis period, including sophisticated spearheads with fluted sides, in some of the higher strata at their excavation. But the Cactus Hill site, a prehistoric hunters' camp on a rise at a protective bend of the river, apparently was used by succeeding generations of people, over thousands of years. Some distance beneath the layer containing fluted spearheads associated with the Clovis period 13,500 years ago, the team found charcoal, tools and animal bones that are much older. "Across the very oldest part of the sand dune there is a narrow ridge, and for a distance of about 300 feet on this narrow ridge there are locations where these people appear to have had very short-term camps. ..." McAvoy said. "They dropped tools and flakes from making tools at a number of locations that appear to have been campfires. In the campfires, we find burned bones, so these people were early hunter-gatherers." The team presented its preliminary findings in a 450-page report in 1997, then for the next three years subjected the artifacts to more exhaustive testing and their conclusions to scientific challenge. "All of the tests that we've run up to this point continue to substantiate the fact," McAvoy said. "The Cactus Hill artifacts are in a separate strata that's been verified as a strata of human occupation by a number of scientific tests, and it definitely is older than the Clovis period level. That's based on some very sophisticated tests in chemistry and luminescence dating, in addition to radio carbon testing." Stanford noted that the Clovis period technology marked by fluted spearheads and the like has subsequently turned up all over the continent--"from the Delmarva Peninsula to California, and from Alberta to central Mexico." But archeologists have not found parallels to the Cactus Hill culture's tools and weaponry except in one place, Western Europe, Stanford said. "For years, we thought the Clovis people were the first Americans, and that they came from Asia, because Indians look like Asians," he said. "I've spent a career now tromping around Asia and the Arctic and the high plains and never found any antecedents for Clovis. Nor has anybody else. So in a 1991 paper, I suggested that Clovis developed out of an existing population in the southeastern United States, which I now think is McAvoy's Cactus Hill material. His dates certainly suggest that's possible, and the [weapons and tool] technology suggests that that's probable." As for comparable tools and weapons, he said, "I see the Solutrean culture of northern Spain. It dates to the same period as Cactus Hill culture--22,000 years at the oldest and 16,000 at the youngest." Stanford noted that the world was at the height of the last Ice Age at that time, with glaciers pushing across most of Europe. "All the populations are pushed away, most of them down into the Iberian Peninsula," he said. "There's not a whole lot of area to support those who got displaced." He believes they migrated north and west, following the coast. Because of lower sea levels and the southward extent of the glaciers, there was an effective land bridge across the North Atlantic at the time, Stanford said, connecting Ireland with the Grand Banks. Where foot travel was difficult, the migrants could have used boats traveling just off shore. "It would have been a wonderful area for these people to exploit—with sea mammals, birds, fish, all kinds of things concentrated along that ice margin," he said. "The distance to North America isn't that far." As for oceangoing boats, "they would have had 30,000 years of research and development," Stanford said. "Folks got to Australia over 50,000 years ago, and that requires crossing a pretty formidable chunk of sea, and we know folks were sailing 25 miles or more off the coast of Japan 28,000 years ago. We know they were going to islands in the Mediterranean in the Paleolithic time." No human remains have been found in either the Clovis or Cactus Hill sites, so DNA testing can't be used to prove either theory. But Stanford and McAvoy pointed out that there is a gene found in inhabitants of Spain, other parts of Europe and North Africa that also has been found in North American Algonquin-speaking Indians.

This takes out all your oppression impacts
BBC in '02
("Stone Age Columbus", November 21, http://www.bbc.co.uk/science/horizon/2002/columbus.shtml)

The impact of this new prehistory on Native Americans could be grave. They usually consider themselves to be Asian in origin; and to have been subjugated by Europeans after 1492. If they too were partly Europeans, the dividing lines would be instantly blurred. Dr Joallyn Archambault of the American Indian Programme of the Smithsonian Institute offers a positive interpretation, however. Venturing across huge bodies of water, she says, is a clear demonstration of the courage and creativity of the Native Americans' ancestors. Bruce Bradley agrees. He feels his Solutrean Ice Age theory takes into consideration the abilities of people to embrace new places, adding, "To ignore this possibility ignores the humanity of people 20,000 years ago."

A2: Give The Land Back – Europeans Here First

Our argument takes out all your sovereignty claims – if Europeans were here first then Natives killed them first and have no right to the land
Newsweek in '99
(Sharon Begley and Andrew Murr, "The First Americans", June 7, L/N)

America, it seems, was a mosaic of peoples and cultures even 11,000 years ago. Based on their study of 11 ancient skulls, conclude Owsley and Jantz in a paper to be published in the American Journal of Physical Anthropology, America was home to at least three distinct groups... None of the fossils [except for one] shows any particular affinity to modern Native Americans... [Skull measurements] depart from contemporary American Indians, often in the direction of Europeans or South Asians.
One explanation for the lack of a family resemblance between the oldest Americans and today's Amerindians is that the original Americans might simply have changed in appearance over the generations . You'd expect them to look different, says anthropologist David Hurst Thomas of the American Museum of Natural History. They're separated by 9,000 years of evolution. A more radical explanation is that the First Americans--perhaps from Polynesia, perhaps from Europe--left no descendants. Whoever got here first, in other words, were not the ancestors of today's Pequot, Shoshone and other tribes . Instead, they were obliterated by later arrivals who made war or made love: killing them or mating with them . Kennewick Man, for instance, had a stone spear point in his hip. Its shape suggests it came from what scientists call the Cascade culture, people who were just moving into the area. It may be a sign of ethnic conflict, says anthropologist James Chatters, who first inspected K Man.
The possibility that today's Native Americans are not the descendants of the original Americans is not going down easily. If you tell the Native Americans that they weren't first, says Thomas, you're asking for trouble. That conclusion, even if proved, has no direct legal ramifications for Native Americans' hard-won gains, such as the right to fish ancestral waters and the right to establish casinos. But it may be just a step before legislation starts being rolled back, Thomas warns. Some Americans resent the newfound wealth of some tribes, and if the discoveries make today's Native Americans just another Ellis Island group, it makes it hard for them to preserve their sovereignty.
Already, Native Americans are protesting this line of research. The Shoshone-Bannock demanded custody of Buhl Woman and reburied her. The Northern Paiute are asking that Spirit Caveman be reburied, and the Umatilla of Washington want Kennewick Man. We know that our people have been part of this land since the beginning of time, said Armand Minthorn, a Umatilla religious leader, in a statement. Scientists believe that because [Kennewick Man's] head measurement does not match ours, he is not Native American. Our elders have told us that Indian people did not always look the way we do today.

Kennewick man proves our argument – white people are natives too
The Washington Times in '01
("Ancient Kennewick Man Proves Politically Unpopular", May 1, L/N)

Thank you for Diana West's April 27 Op-Ed column regarding Kennewick Man ("Long live Kennewick"). I have been disturbed from the moment I learned of the Clinton administration's coverup of the discovery of the remains of a man who predates the American Indian and is believed to have been Caucasian. Showing a disregard for truth, history and science, the Clinton administration sought vehemently to suppress a major scientific and archaeological finding that could have untold implications politically, socially and historically.
Kennewick Man challenges contemporary thought and American Indians who claim that they exclusively have "native" status. As one born within the borders of the United States, I am a native American. Like all whites, blacks and Hispanics born in any of the 50 states, I am a native of this country. No one should claim that title exclusively.
Kennewick Man and the ground on which he was found pose a direct challenge to the propaganda of certain American Indian groups and those who wish to protect their political and social standing even at the expense of truth, science and American history. As you point out, the Army Corps of Engineers, under direction by President Clinton, covered the discovery site with 500 tons of rock and dirt, effectively sealing it from further study.
We can only hope scientists prevail in their suit for the right to study Kennewick Man.

Indians can't claim native status or land rights – Europeans were here first
The Washington Times in '01
("Long live Kennewick", April 27, L/N)

At roughly 9,000 years of age, Kennewick Man is one of the oldest remains ever found in North America. Accidentally discovered in the summer of 1996 by boat-race spectators in the shallows of Oregon's Columbia River, he presented scientists with a thrilling find: the well-preserved remains of a battle-scarred man thought to have been in his 40s, who, perhaps until an arrowhead in his hip brought him down roughly 90 centuries ago, stood about 5 feet 10 inches tall. Even more intriguing was his surprisingly long face and large, protruding nose - facial features that do not resemble those of any known American Indian tribe.
Could he have had Caucasoid origins? While scientists have also remarked on Kennewick Man's similarities to Polynesian, northern Japanese and southern Asian populations, the initial speculation in the local press suggested he may have been an "early white settler," likely spurring the forces of political correction into instant action. After all, there's no room in "Native America" - that peaceable, environmentally friendly myth of pre-Columbian perfection - for "natives" of the "wrong" color. Indeed, American Indians could hardly claim their uniquely privileged "native" status if it were discovered that they were comparative newcomers to the continent. Clearly, Kennewick Man had to buried - both figuratively and literally.

A2: Time-Cube

GENE RAY'S TIMECUBE IS JUST A LOAD OF UNGRAMMATICAL, NONSENSICAL CRAP
Hartwell in 2004

[Mike – Staff Writer for The Maine Campus – 9/24, http://www.mainecampus.com/media/storage/paper322/news/2004/09/24/Style/Timecube.com.Where.Reality.As.We.Know.It.Is.A.Lie-730989.shtml?norewrite200607171432&sourcedomain=www.mainecampus.com]

Finding nut cases on the Internet is easier than finding NASCAR bumper stickers in a Wal-Mart parking lot. Well, watch out, loyal reader, because a Class A specimen can be found at Timecube.com. The Webmaster, self-proclaimed "wisest man on earth" Gene Ray, has run this den of insanity for seven years and counting. The layout is almost as bad as the Falcons Nest (http://www.angelfire.com/sc/thefalcon/). There is no home page or individual sections in Timecube. You just have to scroll down one long page into the spiraling madness at the bottom. The premise of the Web page is to inform the masses that the universe as we know it is a lie. Ray has various graphs that show that each day is really four separate days occurring simultaneously. He assures you that the day is naturally divided into four parts, sunup, midday, sundown and midnight. He is very sure of this. A few years ago he was equally zealous that the day is divided differently into four parts. The Web site used to speak of morning, early afternoon, late afternoon and evening. It appears that Ray is a man of science after all and exchanged his crazy, ironclad view for a similar crazy view.

The entire Web page is written without grammatical editing. Between countless examples of Ray calling you stupid and "educated evil" youll find little gems like, "The academia created 1 day greenwich time is bastardly queer and dooms future youth and nature to a hell."

There is a lot of resentment for Greenwich central time in his Web page. Ray makes it out to be an international conspiracy. After all, when it's noon in England, why should it be night elsewhere on the same day? This seems to confuse our dear webmaster, so he made up an obviously fake letter in broken English about a teacher confessing to sign an affidavit stating that she would "uphold the Greenwich myth until death." For the record, the last quote was originally typed with the Caps Lock feature on.

If you continue to scroll down the endless page, you'll notice subtle little racist ideologies. It builds and builds, until finally he explodes with "Integration is a racial slop, destroying all of the races."

At one point, Ray promises a thousand dollar reward to anyone who can prove that the earth is not a four-sided sphere. This sounds like an easy task. Unfortunately, to win you also need to convince him that his theory is bonkers. That would require an answer spoken in his brand of spaceman logic. Even if you could pull that off with the rising costs of Web space and tinfoil helmets, Ray is probably broke.

The page is not to be taken lightly. If you read Ray for too long you will experience physical pain from the onslaught of lunacy. Do not try to make sense of the illogical flow of bad science and conspiracy theorem or you may experience the pain of death fourfold.

TIMECUBE IS ASANINE—MULTIPLE REASONS
HYPERCUBED.COM in 2005

[July 18, http://blog.hypercubed.com/archives/2005/07/18/time-cube/]

Maybe I'm late on this but I just ran across Gene Ray's TimeCube website (wikipedia). I love everything cubic (especially Hypercubic) but this site is so whacked. It is some sort of rambling of a deranged lunatic with a wacky ass theory of everything. His theory is basically that everything is cubic (whatever that means). I mean this guys is so damn off it is insane…. literally. It would be impossible for me to go through all his theories and debunk them. Not because they are true but because they are incoherent (and awfully formatted). Plus we all know the theory of everything is that everything is hypercubic! Just for fun here is my fictitious argument with Gene Ray:

I think Cubic, I am wisest. You think self, you are evil.

Well, I think Hypercubic so I am wiser then you, Mr. Ray. If you are R and I am H then R=X^3 but H=X^4 which means H=R^4/3 so I am you to the 4/3 power.

I will give $1,000.00 to any person who can disprove 4 days in each earth rotation.

How about starting with the definition of a day according toMW: "The period of rotation of a planet (as earth) or a moon on its axis". You can keep the money for your psychology bills.

I am not allowed to lecture at the word animal academic institutions, for they fear my wisdom will expose and indict the pedant hirelings as betrayers of dumb-ass students - the dung heads who allow their freedom of speech to be suppressed without a whimper, unbelieveable. Word animals will feel the wrath of Cubic curse.

Maybe because we word animals know your are dung head schizophrenic lunatic.

My wisdom so antiquates known knowledge, that a psychiatrist examining my behavior, eccentric by his academic single corner knowledge, knows no course other than to judge me schizoprenic. In today's society of greed, men ofword illusionare elected to lead and wise men are condemned. You must establish aChair of Wisdomto empower Wise Men over the stupid intelligentsia, or perish.

Thank you. Proof that you have been diagnosed schizophrenic. Well, I'm Hyperphrenic… beat that!

There is no human entity, just human Cubics - as in 4 different people in a 4 corner stage metamorphic rotation - never more than 1 corner at same time.

Does that mean that you and I are the same person? But I proved above that I am you to the 4/3 power. I think that means we are both 1 (1^4/3 = 1) or is it zero (0^4/3 = 0).

Nature has no choice but to bring forth a hell upon evil cubelessness. Know it to be of your own making.

Again you are simply wrong by a power of 4/3. Cubelessness is evil, Cubeness is evil^3, convert to Hypercubism or you will bring forth hell upon your self. Hell, exists is a place we can't reach, namely a forth direction or dimension. That is where hell resides and will come forth from a forth direction…. you've been forth warned.

A2: Time-Cube

THE TIMECUBE THEORY IS MATHEMATICALLY FLAWED IN MANY WAYS
Brant in 2005
[Dmitry – Lawyer - August 5, "On Time Cube," http://dmitrybrant.com/timecube/]

Since when does a cube have four corners? A cube has 8 corners, 6 faces, and 12 edges. A cube doesn't have 4 of anything! However, Gene Ray might be referring to "corner" as in the corner of a room. But for that to make sense, we would need to assign a "top" and "bottom" face to each cube we conceive, which would not be practical. The number 4 itself is a square, not a cube.
Aside from the number 4, Gene Ray pulls other numbers out of nowhere, like 4/16, 2×4x4, and so on. This might indicate periods of more extensive synaptic degradation in Ray's brain. Why does all available evidence show that the Earth experiences one day within a single rotation, instead of four days like Ray suggests? In fact, a single rotation is precisely what defines a "day," so to say that more than one day occurs within a single rotation is meaningless. A number of times in the text, Gene speaks of an "absolute proof" of his theory, but never presents one. And the web page that is supposed to hold his explanation of the "4/16 space-times" is conveniently under construction. Gene claims that he will give $1000 to the first person to disprove Time Cube. What would constitute such a disproof? Gene himself calls Time Cube "ineffable." Being ineffable makes Time Cube unfalsifiable, and thus unscientific.

THE TIMECUBE THEORY IS CONCEPTUALLY FLAWED IN MANY WAYS
Brant in 2005
[Dmitry – Lawyer - August 5, "On Time Cube," http://dmitrybrant.com/timecube/]

Gene Ray claims that it is the educational system that is preventing children from learning about Time Cube. So then how can Gene Ray understand Time Cube if he was "educated" in the same way as the rest of us? What was it that made him realize the alleged cubic state of nature? What reason would the educational establishment have to prevent children from learning about Time Cube? If a person grew up completely isolated on an uninhabited island (without an educational system), would she understand Time Cube? I'm willing to bet that she would probably experience a single day in a single Earth rotation. The various applications of the Time Cube theory presented by Gene Ray (rotation of the Earth, the human face, the human races, and human metamorphosis) are completely unrelated. How can a single theory apply to such radically different phenomena?

TIMECUBE'S THEORY IS FLAWED—THE EARTH ISN'T DIVIDED INTO FOUR QUADRANTS
Brant in 2005
[Dmitry – Lawyer - August 5, "On Time Cube," http://dmitrybrant.com/timecube/]

Gene Ray, the formulator of the Time Cube theory wants someone to disprove him, right? Well, I will.
According to him, the earth is divided into four quadrants. How could that be? Maybe you think that the Greenwich Meantime Line also passes at the other side, acting somewhat like a longitudinal counterpart of the Equator. Here is an explanation why it is wrong: The GMT Line is called as it is because it passes on the exact same spot of Greenwich. The two poles act as the endpoints of this specific line. The Equator does not have any endpoint because there is no pole to interfere at the passageway of the line. So why conclude that the GMT Line has no endpoints? Comparison with the Equator alone could tell the difference!
There is another aspect of his theory which is wrong. He also stated that if the earth were divided into four quadrants, then there would be four legged horses. What is its connection with time? We're talking about time and the rotation of the Earth, not the evolution of species! Besides, chickens only have two feet. Does that mean to say that if we will not believe in time cube, we deserve to see half-footed chickens?
What monstrosity are you trying to invent? What happened to the chicken? Its foot got amputated because of diabetes? Wow! I didn't know chickens could have diabetes.

A2: Time-Cube

GENE RAY UNGRAMMATICALLY WRITES THAT WE NEED TO KILL ALL OF THE EDUCATORS WHO DON'T TEACH CUBICISM
Ray in 2002
[Gene – self-proclaimed "Wisest Man on Earth" – www.timecube.com]

Tis Time to kill any educator who does not teach Cubicism above cubelessness. To save humanity from extinction, like prior civilizations perished, youth must redirect self teachers, or destroy them. Stupid Educators know of the Truth I speak and know that it will indict them as the most evil bastards on the Earth. Dumb ass educators fear Gene Ray and his Time Cube Creation - and they run from any mention of Time Cube Debate. Only a dumb student can be educated - as in brainwashed and indoctrinated. Time Cube debate denial is educator evil. It is not immoral for students to kill all educators who ignore Nature's Harmonic Time Cube or suppress free speech rights to debate Time Cube Creation Principle. Ignorance of Time Cube is Greatest Evil.

GENE RAY IS SCHIZOPHRENIC
Ray in 2002
[Gene – self-proclaimed "Wisest Man on Earth" – www.timecube.com]

My wisdom so antiquates known knowledge, that a psychiatrist examining my behavior, eccentric by his academic single corner knowledge, knows no course other than to judge me schizoprenic. In today's society of greed, men ofword illusionare elected to lead and wise men are condemned. You must establish aChair of Wisdomto empower Wise Men over the stupid intelligentsia, or perish.

EARTH ROTATES ONCE EVERY TWENTY-FOUR HOURS, IT'S COUNTER-INTUITIVE TO THINK OTHERWISE
Russel in 2005
[Randy – Scientist @ the University Corporation for Atmospheric Research – January 13, "The Earth's Rotation, http://www.windows.ucar.edu/tour/link=/the_universe/uts/earth2.html]

The Earth is rotating around an axis (called its rotational axis). Some objects rotate about a horizontal axis, like a rolling log. Some objects, such as a skater, rotate about a vertica5l axis. The Earth's axis is tipped over about 23.5° from vertical.
How do we define up and down in space? What would "vertical" mean? For the Earth, we can think of vertical as straight up and down with respect to the plane in which the Earth orbits the Sun (called the ecliptic). Earth's rotational axis points in the same direction relative to the stars, so that the North Pole points towards the star Polaris. Think of the Earth as a spinning top, tipped over to one side. Over very long time periods (thousands of years) the direction of Earth's axis slowly changes due to precession.
The Earth rotates around once in 24 hours - that's a rate of 1000 miles per hour! The time it takes for the Earth to rotate completely around once is what we call a day. It's Earth's rotation that gives us night and day.
The combined effect of the Earth's tilt and its orbital motion result in the seasons.

A2: Ashtar

THE ASHTAR CONFEDERATION ARE NAZIS, AND HELPED HITLER MAKE HUGE AERONAUTICAL PROGRESS
BRANTON 2004
[http://ufo.whipnet.org/xdocs/omega.file/index.html, the foremost researcher on extraterrestrial entities. Accessed 4/24/05]

1932 -- Adolph Hitler gains control of German society enough to force scientists to work in laboratories on advanced aircraft design. Aided by the implosion vortex technology of Victor Schauberger, and the technical expertise of scientists like Schriever, Habermohl, Ballenzo and Miethe, the Germans make extraordinary progress. There is evidence that they might have been aided by contact with Gray entities from inside the Earth and an 'Ashtar' connected group of humanoid aliens in Aldebaran.

ASHTAR IS A LIAR – HE PROMISED TO SAVE PEOPLE FROM CERTAIN DOOM BEFORE, AND NEVER CAME
JOYCE '99
[Elizabeth, expert on ASHTAR and all his incarnations, http://www.soulinvitation.com/ashtar/]

Dr. Charles Laughead, an MD on the staff of Michigan State University in Lansing, Michigan, started communicating with various entities "from outer space" in 1954, largely through trance mediums who served as instrument for Ashtar and his cronies from that great intergalactic council in the sky. A number of minor prophecies were passed long, and as usual, they came true on the nose. Then Ashtar tossed in his bombshell. The world was going to end on December 21, 1954, he announced convincingly. North America was going to split in two, and the Atlantic coast would sink into the sea. France, England and Russia were also slated for a watery grave. However, all was not lost. A few chosen people would be rescued by spaceships. Naturally Dr. Laughead and his friends were among that select group. Dr. Laughhead made sober declarations to the press and on December 21, 1954 he and a group of his fellow believers clustered together in the Garden to await rescue ... and waited. And waited. And waited!

THE LEADER OF ASHTAR COMMAND IS A REPTILIAN NAMED HATONN WHO IS SECRETLY WORKING WITH THE DRACONIAN-ORION EMPIRE TO INFILTRATE AND SABOTAGE ASHTAR COMMAND
BRANTON 2004
[http://ufo.whipnet.org/xdocs/omega.file/index.html, the foremost researcher on extraterrestrial entities. Accessed 4/24/05]

We must realize that the ONLY being in the collective which is allowed to exercise individual choice is their dark leader, and to a lesser extent the inner council, and these beings do NOT want the Reptiloids and Greys to attain emotional individualism. But what about other "collectives" like the ASHTAR or Astarte collective? Just who is this "ASHTAR"? Why is the ASHTAR collective so involved with the Dulce base activity in joint capacity with the Greys and Reptiloids according to certain reports? Is it, as contactee Israel Norkin claims, because the "Unholy Six" star systems of Orion have infiltrated the ASHTAR collective to a massive extent? What about the bald 9-foot tall Reptilian "from the Pleiades" who supposedly defected from the Draconian collective, HATONN? Why hasn't Hatonn been warning about this infiltration of his own collective? Is it because he is secretly working FOR the Draconian-Orion empire? Certainly if he was truly converted from the Draconian collective he could be a lot more zealous in exposing it...especially its infiltration of the ASHTAR collective.

ASHTAR CAN'T SAVE US, THEY'RE DEALING WITH HUGE INTERNAL STRUGGLES
BRANTON 2004
[http://ufo.whipnet.org/xdocs/omega.file/index.html, the foremost researcher on extraterrestrial entities. Accessed 4/24/05]

If we are to believe reports of "Star Wars" taking place within Sirius-B where the ASHTAR collective has its headquarters, then this leaves open the possibility that the ASHTAR collective is in the process of splitting down the middle between an interventionist faction siding with the Draco-Orion Empire and a non-interventionist faction siding with the Andro-Pleiadean Federation.

A2: Ashtar

ASHTAR ADVOCATES THE SLAUGHTER OF CHRISTIANS,
HURST 96

(JD, former editor of Star Force magazine and has firsthand knowledge of channelled (telepathically received) information. He is also a former being of the Reticulan star system and present-life participant in the hybridisation programme, otherwise called the Essassani Project. He is now 22, and all of his life has been what American ufologists term a dual referencer - meaning that he is the subject of a 'human-alien dual identity', "PARADIGMS OF REALITY" http://www.truthseekers.freeserve.co.uk/truth/tr8paradigm.html>)

Allen-Michael Noonan, another Californian, formed a group called the One World Family, after claiming to have experienced contact with an extraterrestrial. Apparently, he was working on a billboard before suddenly finding himself on another planet. Surrounding him were angelic creatures, seated around a luminous throne. A loud voice boomed, "Will you agree to be the Saviour of the world?" Noonan said yes, and has sinced remained in contact with an extraterrestrial called Ashtar, visited other inhabited planets, and regarded himself to be the Second Coming. Noonan also believes that he is the sole channel for genuine communications from Commander Ashtar. Ashtar has assured Noonan that the One World Family will eventually take over the planet, including its governments; but not until all Christians have been "eliminated". As far as I know, the group is still in existence and Noonan continues to receive communications from Commander Ashtar. He has also authored a massive reinterpretation of the Bible, called The Everlasting Gospel.

THE APOCALYPSE FROM WHICH ASHTAR WILL SAVE US WILL NOT BE ANNOUNCED- ANY FOREWARNING MERELY RESULTS IN A DRY RUN
JOYCE 94

(ELIZABETH, AUTHOR OF THE METAPHYSICAL CORNER, LIKE YOUR AUTHORS ARE ANY MORE CREDIBLE, "THE METAPHYSICAL CORNER" http://www.new-visions.com/articles/ashtar.html)

In Denmark a man named Knud Weinking began receiving telepathic flashes in May, 1967, including a number of impressive prophecies which came true ..He was then instructed to build a lead-lined bomb shelter and prepare for a holocaust on December 24, 1967 ...Mediums, telepaths, sensitives, and UFO contactees throughout the world were all reporting identical messages. There was definitely going to be an unprecedented event on December 24, 1967. Ashtar was talking through Ouija boards to people who had never before heard the name. Another busy entity named Orlon was spreading the word. The curious thing about these messages was that they were all phrased in the same manner, no matter what language was being used. They all carried the same warning. People were reporting strange dreams, dreams about symbols of Christmas ... There were also stories about dead telephones and glowing entities prowling through bedroom and homes. Many of these messages, dreams and prophecies were collected together by a British organization calling itself Universal Links. The stage was set for Doomsday. Thousands, perhaps even millions, of people had been warned The Danish cult locked themselves up in their bomb shelter ... After the imaginary crisis had passed, the American wire services finally carried stories about the cowering Danes, ridiculing them, of course. But Mr. Weinking came up with a message that explained it all: "I told you two thousand years ago that a time would be given and even so I would not come. If you had read your Bible a little more carefully, you would have borne in mind the story of the bridegroom who did not come at the time he was expected. Be careful so that you are not found without oil in your lamps. I have told you I will come with suddenness, and I shall be coming soon!"

THE ASHTAR COLLECTIVE HAS BEEN TURNED TOWARD THE AGENDAOF THE NINE FOOT REPTILOID CALLED HATONN. HE POSES AS AN ASCENDED MASTER TO SUBVERT ASHTAR TOWARD THE DRACO-ORION CONFEDERATION
THINK ABOUT IT DOT COM DATE IRRELEVANT

[http://think-aboutit.com/aliens/supersynopsis.htm]

The axis forces lose [temporarily] World War II, however the Jesuits continue their ongoing infiltration of the Masonic lodges that began in 1776 with the establishment of the Bavarian Illuminati by Jesuit Adam Weishaupt and the so-called Scottish Rite within the Jesuit college of Clermont in France. While this is occurring on earth the Orionites are working relentlessly to "hack" the Ashtarian electronic collective which links member worlds together via psionic subspace transceiver implants. The computer-based collective is successfully infiltrated by the Orion forces, who begin using psyho-spiritual propaganda and manipulation to turn the Ashtar collective towards their agenda, masquerading as "Ascended Masters". A 9 ft. reptiloid named Hatonn feigns "defection" from the Kamagol-Draco-Orion group and insinuates himself into a position of 'master scribe' for the Ashtar collective, however his continued involvement with the Draco-Orion backed "ULTRA" bases under Anta! rctica and New Mexico suggest that he is actually a double agent, and certainly he shares the same anti-Semitic views as his "Nazi" allies under Antarctica.

A2: Ashtar

THE REPRESENTATIVE OF THE ASHTAR COMMAND SAYS THAT THE ONLY WAY WE CAN ASCEND TO THE NEW AGE IS TO END NUCLEAR CONFLICT
GRAMAHA, REPRESENTATIVE OF THE ASHTAR COMMAND, **1977**
[QUOTED FROM JOHN HURST ARTICLE, "THE ASHTAR GALACTIC COMMAND" http://ufocasebook.com/radioet1977.html]

"This is the voice of Gramaha [?], a representative of the Ashtar Galactic Command, speaking to you. For many years you have seen us as lights in the skies. We speak to you now in peace and wisdom as we have done to your brothers and sisters all over this, your planet Earth.
"We come to warn you of the destiny of your race and your world so that you may communicate to your fellow beings the course you must take to avoid the disasters which threaten your world, and the beings on our worlds around you. This is in order that you may share in the great awakening, as the planet passes into the New Age of Aquarius. The New Age can be a time of great peace and evolution for your race, but only if your rulers are made aware of the evil forces that can overshadow their judgments.
"Be still now and listen, for your chance may not come again. For many years your scientists, government and generals have not heeded our warnings; they have continued to experiment with the evil forces of what you call nuclear energy. Atomic bombs can destroy the Earth, and the beings of your sister worlds, in a moment. The wastes from atomic power systems will poison your planet for many thousands of your years to come.
"We, who have followed the path of evolution for far longer than you, have long since realised this - that atomic energy is always directed against life. It has no peaceful application. Its use, and research into its use, must be ceased at once, or you all risk destruction. All weapons of evil must be removed.
"The time of conflict is now past. The race of which you are a part may proceed to the highest planes of evolution if you show yourselves worthy to do this. You have but a short time to learn to live together in peace and goodwill.

THE FACTION OF THE ASHTAR COMMAND THAT WANTS TO INTERVENE IN WORLDLY AFFAIRS IS ACTUALLY FROM THE DRACONIAN-ORIONITE EMPIRE THAT ASSIMILATED THE ASHTAR COMMAND; THE REAL COMMAND FIGHTS AGAINST INTEVENTIONAISM
BRANTON, IS STILL 10,000,000 TIMES MORE QUALIFIED THAN YOUR AUTHORS, **2004**
[THE DULCE BOOK, CHAPTER 17, http://www.ufoarea.com/government_dulce_branton_ch18.html]

All this is based on reports from contactee Israel Norkin and others that the Ashtar collective has been infiltrated by Draconian-Orionite agents posing as "ascended masters", and that a large segment of the "Ashtar Command" has been commandeered by these interventionist-collectivist forces and has split off from another large segment of the 'alliance' which has apparently sided with the Andro-Pleiadean Federation. What distinguishes the two is that the Andro-Pleiadean Federation believes in Truth-Individualism-Non Interventionism whereas the Draco-Orion Empire adheres to a philosophy of Deception-Collectivism-Interventionism.]
According to contactee Alex Collier these two factions are now or have been at war within the Sirius-B system, and this conflict has entered the Sol system with the Draconian-Orion reptilians and their paraphysical overlords operating from Hale-Bopp comet in collaboration with their rebel Sirian cultists who were/are operating from within the "infiltrated" segment of the Ashtar collective, occupying Hale-Bopp's so-called "Companion" battleship -- reputedly a "...former Sirian alliance battleship..." -- which some have dubbed "Hale-Mary". This saturn-shaped object was seen AND photographed by BOTH Chuck Shramek AND is also seen in a leaked Hubble Space Telescope image, along with other 'objects' that apparently 'jumped ship' as the comet circled around the sun. This scenario seems to be remaniscent of the movie "LIFE FORCE" which depicted a race of draconian-like alien 'vampires' that entered the system undetected in the tail of a comet. Alex Collier claims that the non-interventionist from the Pleiades and Andromeda constellations, from Tau Ceti, Procyon and others systems, have "blockaded" the Sol system near the orbital sphere of Neptune in order to keep the Draconian-Orionite forces out and to keep them from interfering with our planet at this CRITICAL and VULNERABLE point in planet earth's history. According to Collier's other-wordly friends, there have been devastating battles with casualties on both sides that have been waged between the Federation and the Empire in this CURRENT "war in heaven" [current as this is being written] involving our Sol system, and also in one that was waged shortly before this in the Sirius system... a war that has gravitated from Sirius to our own Sol system. So, PRAY FOR our "friends out there" who are risking their lives for OUR sakes. It is the very LEAST that we can do...

THE DRACO-ORION EMPIRE IS RESPONSILBE FOR OVER FIFTY MILLION DEATHS IN THEIR WAR WITH THE REST OF THE UNIVERSE (USE WITH THE CARD SAYING THE DRACO-ORIONITE EMPIRE HAS TAKEN ASHBTAR COMMAND OVER)
THINK ABOUT IT DOT COM DATE IRRELEVANT
[http://think-aboutit.com/aliens/supersynopsis.htm]

The Draco-backed Orion empire of the "Unholy Six" [six Draco controlled star systems] attack the Lyra systems and devastate three worlds, initially killing over 50 million Lyrans and more as the "war" continued. Refugees escape to Taygeta Pleiades and Zenatae Andromeda. An onging war between Orion and Sirius [Rigelian exiles] continues for centuries.

A2: AShtar

DEPENDING ON THE DRACO-ORION EMPIRE FOR SALVATION JUSTIFIES INTERGALACTIC MASSACRE, AND LETS OUR WORLD BECOME ASISMILATED INTO THEIR INTERSTELLAR EMPIRE
BRANTON, IS STILL 10,000,000 TIMES MORE QUALIFIED THAN YOUR AUTHORS**, 2004**
[THE DULCE BOOK, CHAPTER 17, http://www.ufoarea.com/government_dulce_branton_ch18.html]

William Hamilton incidentally has voiced his concern that Sharula, being a member of the ruling class of Telos, seems to be involved in this current conflict taking place between the two Ashtarian factions, the Draco-Orion faction and the Andro-Pleiadean faction, although just how this has affected her on a personal basis is unclear. This may also hold true with the entire "Melchizedek Order" which has a major presence in Telos, in the Saturnian moon base-cities, in Sirius, in Arcturus and elsewhere. Most of the misled Sirian cultists are being led to believe that the New World Order is being orchestrated for the purpose of establishing world peace and laying the groundwork to usher in a "planetary ascension" into higher dimensions in a harmonious and orderly fashion. They forget however the history of atrocities that have followed the ancient Bavarian-Roman cults who are promoting the New World Order and of their reptilian hosts in Draconis and Orion... the massacres in Lyra, Rigel and Procyon being a few examples (if you don't know what I'm talking about at this point, you WILL by the time you finish this 'volume'. - Branton). In short, the Draconians and Orions are psychologically and emotionally manipulating their cultic human followers in Sirius-B, the Gizeh empire & Bavaria who are tied-in with the "dark side" of the Ashtar collective, to establish a global government which they intend to annex to their Luciferian Interstellar empire-collective.

ASHTAR CANNOT EXIST; THE EARTH IS FLAT, PROVEN BY LIGHT PULSE EXPERIMENTS IN THE ETHER
FLAT EARTH SOCIETY 1998
[http://www.alaska.net/~clund/e_djublonskopf/Flatearthsociety.htm, Why a flat earth?]

In this experiment, the general idea was to try to calculate the absolute speed of the earth relative to the fixed ether. In a sense, they would emit a light pulse, and calculate how far it "trailed" behind the earth, much like tossing a napkin out the window of a moving car to calculate the car's speed. It was assumed that, if ether existed, the light pulse would fall back in one direction, giving the physicists a tangible "absolute" speed of the earth. Their calculated speed: Zero.
Yes, scientists Albert A. Michelson and Edward W. Morley were baffled by this, wondering how the Earth could be sitting in one spot, while every aspect of the teachings of Grigori Efimovich indicated that the planet must be orbiting its own sun, and therefore must be moving at least with a critical orbital velocity. Moving quickly to avoid having to admit that they were wrong, they were able to instead "infer" from their results that the ether must not exist, and that light must propagate through no medium at all (impossible for a wave by the very definition of a wave). Their inference was generally accepted by the scientific community (save a few notable exceptions, including Hendrik A. Lorentz) and the "ridiculous" notion of ether was thrown out.
But light waves would still require a medium for transmission, and the actual purpose of the experiment was to determine the existence of that medium. The results speak for themselves: the Earth does not move. And even if the Earth did, the problems inherent in keeping it moving through this light medium called ether are overwhelmingly supportive of "Flat-Earth" theory

SPACE IS NOT A VACUUM; ETHER MEANS THAT THE EARTH WOULD HAVE GROUND TO A HALT IF IT WAS MOVING
FLAT EARTH SOCIETY 1998
[http://www.alaska.net/~clund/e_djublonskopf/Flatearthsociety.htm, Why a flat earth?]

In the Efimovich model, the planet Earth is supposed to be a large, spherical shaped ball of rock flying through space at hundreds of thousands of miles per hour. But how could the Earth continue to move at the same speed for as long a time as the "round Earthers" say that it has existed for; namely, several billion years. If outer space were a vacuum, then there would be no problem. But space is not a vacuum, it is instead filled with ether. The earth would have to have been pushing its way through the ether for all those billions of years. Shouldn't it have slowed somewhere along the line? What would keep the Earth from grinding down to a stop at some point on the Efimovichian timeline?

A2: Ashtar

IF THE EAARTH WAS HELD IN ORBIT WITH CENTRIFUGAL FORCE, THINGS WOULD BE FLUNG OFF ONE SIDE OF THE EARTH AND CRUSHED ON THE OTHER
FLAT EARTH SOCIETY 1998
[http://www.alaska.net/~clund/e_djublonskopf/Flatearthsociety.htm, Why a flat earth?]

A second critical piece to the Efimovich model is that the Earth is not the center of the solar system either. It is, according to "round Earth" theory, orbiting the sun at a radius of around five-hundred million kilometers. Were this the case, the Earth would be an accelerated object in circular motion around its sun. And thereby are the problems introduced. The Earth accelerating in circular motion would behave no differently than would a car taking a corner: loose objects (humans and animals would act like loose change or a cup of coffee on the dashboard) would slide around, or be thrown off completely. There would be an apparent centrifugal force on everything. During the day, when things would be facing the sun and therefore on the inside of the "orbit", buildings would be crushed and humans beings squashed like grasshoppers in a centrifuge. And at night, when everything would be at the outside, trees and buildings would be ripped from the ground and flu! ng into outer space, and humans wouldn't stand a chance. Obviously, there is a flaw in Efimovich's "orbit" theory.

THE FLUID NATURE OF WATER MANDATES THAT ON A ROUND WORLD THE WATER WOULD FLOW OFF THE SIDES
FLAT EARTH SOCIETY 1998
[http://www.alaska.net/~clund/e_djublonskopf/Flatearthsociety.htm, Why a flat earth?]

Conventional thinking would suggest that the water would just run down the sides of the Earth (to use the analogy again, like droplets running down the sides of a beach ball) and fall into outer space, while the air would dissipate. Using the earlier mentioned idea of "gravitational charge" gives some credibility to the theory. If the fluids were static, then exposure to the gravitational field for a long enough period of time would allow their molecules to align themselves with and be pulled in by the field.
But fluids are not static, especially not in the atmosphere and oceans. Great ocean currents run both at the surface and deep below, carrying water across huge basins, keeping the solution far from stagnant. Jet streams of air travel at hundreds of miles per hour through the atmosphere. And windblown rainclouds carry vast quantities of evaporated seawater across miles of ground, releasing their load far from its starting point. Water or air that (according to "round-Earth" theory) starts on one side of the planet could end up completely on the other side in a matter of only a few days. With all this turbulence and motion, if the world were round, the oceans should all fall "down" into the sky, leaving the planet dry and barren, and the atmosphere would simply float away. Why, just look at the moon. It is round, like a ball, and yet it has no atmosphere at all.

ASHTAR WOULD SAVE US FROM A NUCLEAR WAR TWENTY-FIVE YEARS TOO LATE
SANANDA DATE IRRELEVANT,
[WWW.ASHTARCOMMANDTRUTH.COM]

Sananda: We have had to consider his binding theological prejudices, his apathy, his indifference, his general close-mindedness in most of these things, but most of all, his outright hostility to those whom the Father has sent to reason with him. Because of this militancy, our progress for the world plan has been delayed for twenty-five years. Many have wearied that it would ever come to pass.

THE ONLY INTENTION THE ASSIMILATED "ASHTAR COMMAND" HAS WITH EARTH IS TO MAKE IT THE NEXT BASE IN THEIR INTERGALACTIC WAR
THINK ABOUT IT DOT COM DATE IRRELEVANT
[http://think-aboutit.com/aliens/supersynopsis.htm]

The infiltration of the Ashtar collective especially in Sirius-B allows the Draco-Orion forces to infiltrate and conquer one particular planet in Sirius-B, formerly inhabited by 'Nordics' yet the reptiloids began to infiltrate and "replace" the humanoids via shape-shifting, technosis, plasto-genetic surgery, and laser-holograms or a combination of the above. Another planet in Sirius-B [Bellaton] remained however under human control. The Draco-Orion backed planet in Sirius-B begins a massive campaign to amass a huge military space armada of warships for the purpose of invading planet earth strategically at a time when the eco-political systems are collapsing [with the help of their fifth column agents already one earth]. The invasion is scheduled for 2004 [the REAL purpose for most abductee programming], and the invasion force intends to join with their fifth column forces on and under planet earth [Kamagol-II cult and its extensions at Pine Gap Australia and Dulce/Lo! s Alamos New Mexico] to enforce the New World Order's electronic "assimilation" of the planet into the Draco- Orion "Hive" into which much of the Ashtar collective itself has since been assimilated. The purpose is so that planet earth and its unique animal, vegetable, chemical, liquid, mineral, genetic-metagene, energy and electromagnetic resources along with time-space vortex gates above and below ground can be assimilated so that planet earth can be used as a staging base to attack the enemies of the "Hive" on other worlds and in other dimensions.

A2: E-Prime

Turn- E- Prime doesn't solve the problems with "to be"– it only reorganizes and masks illogic
Lakoff 1992
(Ronin, Professor of Linguistics at University of California Berkeley, Et Cetera, "Not Ready for Prime Time", Summer, p. 142-143)

But simple solutions like this one too often prove simplistic, and I would argue that that is the case of E-Prime, on four grounds. In the first place, to the degree that adopting it inoculates the language against illogic, E-Prime does so indirectly - the gain in logic is **not a direct result of the avoidance of be**. Secondly, there are languages which make much less use of be than does English, but there is little reason to believe that their speakers thus achieve more logical communication. Thirdly, even if E-Prime were to produce the benefits claimed for it, its adoption would involve a radical change in the grammar of the language, one that would be extraordinarily hard to inculcate. Finally and perhaps most seriously, recasting sentences so that they do not contain be merely reorganizes their illogic rather than removing it. In this way, the avoidance of the copula encourages the reframing of questionable assertions as presuppositions — equally dubious but harder for hearers or readers to identify and examine.

E-Prime can't solve- widespread societal linguistic practices overwhelm and other languages prove our argument
Lakoff 1992
(Ronin, Professor of Linguistics at University of California Berkeley, Et Cetera, "Not Ready for Prime Time", Summer, p. 143-144)

Perhaps, by being forced to substitute an unfamiliar sign for a familiar one, I will be induced to pay more attention to the process of addition than I normally would, and so get better results. But in this case, any substitution for the familiar formula will have similar effects: it is the compelling nature of novelty that creates logical thought rather than any particular change itself. The same is true when other syntactic constructions are substituted for be by users of E-Prime. There is even some empirical evidence that removing be from a language, or at least making its occurrence less frequent than in English, has **no discernible effect** on the communicative logic of its speakers. Modern Russian does not use be in the present tense at all. Most of the ancient Indo-European languages (for instance, Latin, Greek, and Sanskrit) could optionally omit be to create "nominal" sentences. There is, needless to say, very little evidence indeed that speakers of these languages were any more logical than contemporary Americans. While languages continually change in response to their own structural demands, human attempts to meddle with linguistic form have a doubtful track record. Occasionally attacks on one or another form have banished it outright or restricted it to marginal existence, as with ain't; but far more often, attempts to "improve" language by deliberate changes have met with abject failure and have sometimes led to worse situations than those they were designed to correct. Prescriptivists have been trying to get rid of the intransitive use of lay (replacing lie) for years, but lay keeps gaining new ground, with no consequent loss of clarity. Schoolteachers labored so tenaciously to rid the world of constructions like Him and me are friends that speakers of English have become terrified of the objective case in all compound pronoun constructions. The outcome? This argument is between you and I has become essentially Standard English — a triumph of linguistic insecurity. The linguist Robert A. Hall years ago wrote a book called Leave Your Language Alone — advice we should heed in this instance as elsewhere.

Turn- E-prime's rejection of the "to be" reinscribes us into linguistic domination by destroying any possibility of resistance
Lakoff 1992
(Ronin, Professor of Linguistics at University of California Berkeley, Et Cetera, "Not Ready for Prime Time", Summer, p. 144-145)

Finally, encouraging the replacement of be with other constructions will often have the effect of changing an illogical proposition from an assertion to **a presupposition**. Asserted matter in sentences is generally the new or most salient information — what a hearer or reader needs to know. Presuppositions express background information: what someone needs in order to make sense of the assertion or place it in a context. Compare the following sentences. In the first, the italicized matter is asserted; in the second, presupposed.
(1) Michael Dukakis is President of the U.S. and has dissolved the Internal Revenue Service.
(2) *U.S. President Michael Dukakis* today dissolved the Internal Revenue Service.
A hearer of (1) who is disturbed at the italicized matter is **free to question it**: it is accessible, syntactically and psychologically. By contrast, the same information is much more apt to slip by our notice in (2), since it is encoded in a form that we normally interpret as "old information," and pay it little heed. So it would not be strange to respond to **(1), "WHO did you say was President?"** But it might seem strange, or at least communicatively uncooperative, to do the same with (2). Slipping dubious matter into presupposed forms is one of the oldest, and sleaziest, tricks of the advertis-
er and the propagandist. The reformer must be wary of following in their footsteps.

A2: E-Prime

E-prime doesn't solve- the fundamental problem is not "to be", but the acceptance of illogical and evil messages – people must use logic and not allow language to do it for them
Lakoff 1992
(Ronin, Professor of Linguistics at University of California Berkeley, Et Cetera, "Not Ready for Prime Time", Summer, p. 146)

Responsible analysts of language have as part of their job the tasks of explaining why and how language can be used to mystify and bamboozle and suggesting ways to avoid being victimized, and to use language to maximize reason, justice, and equality. E-Prime is a noble effort in those directions. It is valuable, too, in forcing people to think carefully about the consequences of their communicative choices. But I don't think it is likely to accomplish the laudable results it promises. It is true that language has been the bearer of vicious, destructive messages, and that these messages have often been believed and acted upon despite their irrationality. **But language is only the messenger, not the message**. To change the form of the language is like giving an evil message to a different messenger with the hope that when it is received, it will no longer have bad effects. To keep language from being illogical, its users must cease to think illogically. Or, at the very least, its users must become willing and able to do the hard work of determining the logic of the messages they receive, rather than hoping that language form itself will do that hard work for them.

The harms of "to be" are overstated – can be used correctly and effectively
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 176)

The harmful effects that may result from the use of the is-of-identity and the is-of-predication are often ameliorated by the context, and so the need to eliminate all such statements from our language is not as great as the advocates of E-Prime apparently assume. It is one thing to say, "The rose is red" in a flat statement of "fact"; it is quite another to say, "The rose is red to me" If in response to the question, "What does John Jones do for a living?" I answer, "He's a professor," there seems to be little that a general semanticist should quarrel with, given that the response is occurring within the context of asking what the man does for a living, a context that greatly affects the meaning of the answer.

E-Prime is not key to communication- only a risk that it destroys linguistic diversity
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 175)

THE CLAIM THAT E-Prime has an inherent, beneficial effect on a person's writing ability seems highly questionable, considering that E-Prime deliberately **eliminates a whole class of statements** from the language, resulting in fewer alternatives. The English writer can use all of the statements available to the E-Prime writer, plus a whole class of statements containing the verb "to be." The greater variety of available wordings should make the English writer's efforts **more interesting to read**, not less. (Any bad writing that occurs because of the over-use of the verb "to be" — a common failing — can be more easily overcome by simply cutting back on one's use of "to be," rather than resorting to E-Prime.)

Turn- assumption- identity statements are assumed in a world of E-Prime- using "to be" identity statements is critical to challenge linguistic hegemony
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 175)

Eliminating "to be" from the English language may have little effect on eliminating identity from the language. A statement such as, "The practice of E-Prime is silly," has a telltale form, and can be easily recognized by general semanticists as having the structure of identity (or predication). Yet, a statement of apparently equal identification, "The silly practice of E-Prime continues," can be made in E-Prime without the verb "to be." The latter form may even hold more dangers. Since the E-Prime statement assumes an identity rather than asserting it, **our ability to recognize it as a problem is hampered**. That does not favor the adoption of E-Prime.

A2: E-Prime

E-prime's foreclosure of higher orders of abstraction leads to linguistic devolution
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 175)

The phrase "the natural order of evaluation," as a general semantics formulation, refers to the process of moving from lower orders of abstraction to higher; from, for example the notions of test-taking, attending classes, and reading textbooks, to the generalized notion of "student." A civilization advances when it can move from the idea of individual trees to that of "forest." Korzybski claimed that the capacity to produce higher and higher abstractions leads to a general consciousness of abstracting, which he described as "**the very key to further human evolution**." (Science and Sanity, 3rd ed., p.xxi) E-Prime tends to make the expression of higher orders of abstraction more difficult; instead of describing someone as a student, for example, the E-Prime speaker is more likely to say, "She attends classes at the university," or some such thing. That sort of forced return to lower orders of abstraction may have drawbacks that the advocates of E-Prime have not examined. It would seem more in line with the time-binding of the human race, to leave the individual free to choose the appropriate order of abstraction in the given case, rather than to erect a structure that forces him or her to lower orders. Of course, many individuals do neglect the lower orders of abstraction in their talking and reacting, but training in general semantics may be a better prescription for that malady than E-Prime.

Rewording Permutation Solvency- Do plan and re-word the affirmative's English text into E-prime
Rewording solves best- it allows an easier societal transition to E-Prime
French 1993
(James, Programmer at University of California Berkeley, Et Cetera, "The Prime Problem", Fall, p. 331-332)

I nominate a term suggested by Charlotte Read — the term "rewording" — defined as, "the practice of wording or rewording one or more sentences to avoid the is-of-identity and the is-of-predication in the English language." Rewording should fit nicely with the other extensional devices, e.g., "indexing, dating, rewording"; and since, like "indexing" and "dating," "rewording" says what it does, students of general semantics should find the name easy to understand. As with the other extensional devices, rewording could be used as much or as little as one desired. But of course, students would be encouraged to reword their more pernicious is-of-identity and predication statements, just as they are encouraged to date or index other statements. The prohibition against "all" uses of "to be" could be retained as a rewording exercise, to be used in the classroom, and for individual practice on one's own, if desired. (The vast majority of E-Prime devotees seem to use it only as an exercise anyway. As of the date of this writing, I know of only five persons who claim to both speak and write in it consistently. As I see it, the so-called lesser forms of E-Prime are not "E- Prime" by its own definition.) Of course, outside of general semantics, nothing would prevent individuals from adopting the practice of E-Prime, just as nothing prevents them from using Zen meditation or any other technique.
By adopting rewording as an extensional device, we could accomplish most of the laudable goals of E-Prime, and allow a more flexible approach to the problems of "is," while maintaining the integrity of our discipline.

Turn- An E-Prime movement would only destroy language and further alienate the public from general semantics
French 1993
(James, Programmer at University of California Berkeley, Et Cetera, "The Prime Problem", Fall, p. 333)

Finally, let me say that, although I have quite a few objections to E-Prime as a formulation, I have even more objections to it as a movement. Three things in particular come to mind. One has to do with the tendency of E-Prime promoters to add items willy-nilly to the agenda of general semantics, such as opposing the use of the passive voice, without the long period of review and debate which should precede the adoption of new items. Novices are left with the impression that these things are basic tenets of general semantics, which is not the case. The second objection has to do with the inclination to display a strongly disparaging attitude toward any use of the verb "to be" by others, a penchant that seems reminiscent of witch-hunting. The third objection is the tendency to make sweeping, unverified claims about the benefits of eliminating the verb "to be" entirely from English, e.g., that it improves one's writing. (For arguments against that claim, see note 9.) None of these propensities is consistent with a discipline grounded in science, in my view.

A2: E-Prime

E-Prime does not improve writing- eliminating ALL instances of "to be" only degrades English
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 176)

THE CLAIM THAT E-Prime has an inherent, beneficial effect on a person's writing ability seems highly questionable, considering that E-Prime deliberately eliminates a whole class of statements from the language, **resulting in fewer alternatives**. The English writer can use all of the statements available to the E-Prime writer, plus a whole class of statements containing the verb "to be." The greater variety of available wordings should make the English writer's efforts more interesting to read, not less. (Any bad writing that occurs because of the over-use of the verb "to be" — a common failing — can be more easily overcome by simply cutting back on one's use of "to be," rather than resorting to E-Prime.)

The permutation solves- any gradual reduction in the use of "to be" helps
Kellogg III 1992
(E.W., Vice President of ISGS, "The Good, The Bad, and The Ugly: Comments on the E-Prime Symposium p. 206-207, http://learn-gs.org/library/etc/49-2-kellogg.pdf

Must one use 100% E-Prime to reap any of the benefits? **Certainly not . Any reduction in the use of "to be" can prove beneficial**, and I applaud the efforts of anyone who moves in this direction . An all-or-nothing attitude can **sabotage the learning of E-Prime by the beginner**, and even after achieving a certain level of skill an individual may not choose to go "all the way". However "weaker" forms of E-Prime can no longer take advantage of the relatively simple rule (no use of any forms of "to be") that allowed me to make changes inmy language use in "real time" -- while speaking or thinking. This has brought about such deep-seated changes in the way that I process information that I even dream in E-Prime . For advanced practitioners who want to reap the maximum benefit, and to learn to habitually think in E-Prime, I recommend that they adhere to the rule of complete elimination of "to be," because at this point in time (1992) only this extreme form of the discipline has succeeded in achieving such a result.

E- Choice solves best- it avoids the destruction of our language that E-prime entails
Menefee 1991
(Emory, Former President of the ISGS, "E-Prime or E-Choice?" http://learn-gs.org/library/etc/48-2-menefee.pdf)

Probably not many people would object to these arguments. Nevertheless, I think we would be ill-advised to relinquish the full array of our language, flawed with "to be" and riddled with the passive though it is . Even though careless use of dynamite can kill, the explosive has not been banned ; instead, people have chosen tolearn its dangers and proper use . Rather than taking the axe to our rich language, let us learn (as we should have learned from our English teachers) how to use it optimally. This kind of optimum English I would call E-Choice. (Note 1) Scientists are not often considered great writers, but they have evolved a way to write, in whatever language, that conveys necessary information with a minimum of ambiguity. In general, tentative conclusions and speculationsare easy to recognize. In English, this style would be a form
of E-Choice, exhibiting clarity and sometimes even gracefulness .

The affirmative's metaphorical conflation of humynity with technology undermines humyn identity
Gozzi 1989 (Raymond, Professor of Communication @ Bradley U, "Metaphors that undermine human identity")
http://learn-gs.org/library/etc/46-1-gozzi.pdf

A two-fold process, discoverable in our language about computers and about people, is subtly undermining our human identity.
This process involves, first, the externalization of human qualities onto machines; and second, the internalization of machine qualities into humans. Occurring through our choice of metaphors, the process has consequences for the debates in our culture over the nature of humanity, intelligence, mind and machinery.
It makes a difference whether we speak of a computer as having a "memory" or a "data-storage capacity." By attributing human qualities to machines, especially computers, **we lose sense of what is human**, have less understanding of how humans differ from machines, and construct an image of powerful machines and frail humans. The metaphorical undermining of human identity is only intensified by the careless use of language; it may be partly preventable by proper use of language and care with our metaphors.
Granted, the metaphorical use of human terms, such as "memory" for computer capacity, is a way to make complex technological functions more understandable. While this is a desirable goal, serious confusion arises from such semantic practices. I do not believe that computers "think" or have "memories"; neither do I believe that humans are machines. **Linguistically confusing people and machines amounts to a serious category mistake which has consequences for how humans regard themselves.** To discover the tendency to externalize human qualities onto machinery, we can examine the changing definitions that lexicographers report.

A2: E-Prime

Turn- E-prime ultimately destroys language- leading to linguistic totalitarianism and caveman communication
Menefee 1993
(Emory, Former President of the ISGS, "One Grunt or Two?, Et Cetera, Fall, p. 343-345)

MY NAME is ALFRED. This sentence, besides giving my name, demonstrates what we used to call an "is of identity" construction, which early believers in E' thought was the most deadly use of the verb "to be." You who someday read these words will most likely not know that E' (E-Prime) was the name given to a variety of English without any of the forms of "to be." It became popular for a while, because its champions claimed that it would reduce or eliminate statements of identity (equating one abstraction with another as in the first sentence above), the passive voice, notions of permanence, and other problems that caused people to misuse and misinterpret the language with often unfortunate results. The E-Primers were a group of otherwise nice folks who started us on a **fatal spiral of language "correctness**," leading finally to our present deplorable situation, though I suppose one could say that we have succeeded in achieving "communication" with no ambiguity whatsoever.

But I'm ahead of myself. The E-Primers zealously spread their message, and after a few years it became mandatory to teach only E' in our schools. Amazingly, speakers of the rest of the world's languages fell into line. Unfortunately, life and strife went on much as before **(people managed to misunderstand each other just as well without "to be" as with it**). Eventually, though, a shattering discovery was made: identification could occur using verbs besides just "to be." Saying, for example, "Charlie has the brains of an ass" left little doubt about identifying Charlie with an ass, and seemed even more insulting than, "Charlie is an ass," because it was clear to most people that Charlie couldn't bray. **Obviously the next step was to legislate against the "to have" verbs**. Soon, many more equally troublesome verbs were identified and added to the list: appear, become, come, consist, continue, feel, get, go, grow, involve, keep, lie, look, prove, remain, resemble, run, seem, sit, sound, stay, turn, wax, and others too numerous to mention. People promoting this change called themselves Double Primers, and though there was some grumbling, before long the schools were teaching this new version, now called E". Luckily, many graduates found work rewriting already published literature.

The Double Primers waxed eloquent about the new English, but the reform proved futile: people were still able to make trouble for each other through language. Inevitably, one day the Triple-Primers came along, a group that had realized adjectives are forms of identification, too. For example, if somebody said, "That beautiful flower," it surely meant pretty much the same thing as saying "that flower is' beautiful**." Obviously, all adjectives had to be eliminated**, and so E'" was born. Heavy penalties were exacted for anybody caught with an adjective. Unfortunately, the goal of creating harmonious communication still wasn't within reach: people developed such stress and worry ab out incorrectness and punishments that they fought over almost nothing.

At long last, theoreticians among the Triple-Primers recognized the core of the problem: language. People talk and write and incite with language, they tell each other off in language, they plan, scheme, cheat with language. The ultimate solution thus became crystal clear: **complete elimination of all language, with capital punishment** (or even worse) **for anyone caught using any form of recognized speech.** What a stroke! Disagreement virtually stopped, except for occasional local tribal battles over who got the most food around the fire. Industry and commerce vanished, and, except for all the bodies that resulted from rampant starvation and fighting, pollution became nearly nonexistent.

I remember an old story about someone named Gulliver who visited the School of Languages in Laputa. The scholars there had decided that using words shortened life, so they should communicate by showing the "things" that words stand for. Serious talkers had to carry a huge bag of these "things," though one could stuff enough under one's arms for a short conversation. Maybe this is where Korzybski, another old timer, got the idea that the most basic communication is pointing at something. Anyway, that's what we do these days: point at things — though most people find it helps to grunt now and then, by way of emphasis.

I'm scratching this message into a rock; I may be the last person either crazy enough or able to write in the old way. It's dangerous, but perhaps someone will understand it one day.

didn't think we had cards on that did you?

A2: E-Prime

E-Prime's blind rejection of to be only has a risk of destroying linguistic clarity by obliterating harmless "to be" statements
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 175)

The range of perfectly acceptable "to be" statements covers a vast expanse, and includes asymmetrical relations, e.g., "Mt. McKinley is higher in elevation than Mt. Shasta"; negation, "The map is not the territory"; location, "Oakland is on the west coast"; auxiliary, "It is raining," "I am going to the store," etc.; and possibly many other unidentified forms, e.g., "I am aware of that." These forms must be sacrificed when adopting E-Prime, at considerable cost for no proven benefit.**"**

To be has plenty of potential"- we shouldn't axe it
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 175)

There may be considerable benefits to humankind in the use of the verb "to be" that the formulations of general semantics do not take into consideration. We know that one of the best languages for time-binding is mathematics, a language that relies heavily on the notion of equivalence and equality "Y = Z" seems quite similar in form to John Jones is that professor." Mathematicians do not ascribe content to their languages, however, whereas English speakers frequently confuse language and "reality." For the purposes of time-binding and progress, it may be better to keep to be in the language - but cut the link between identity-in-the-language and identification-in-our-reactions (by training ourselves in general semantics) - rather than to take a meat-axe to the verb "to be."

E-Prime's uncritical rejection of all instances of "to be" is a bankrupt theory that should be thrown out of general semantics
French 1992
(James, Programmer at University of California Berkeley, Et Cetera, "The Top Ten Arguments Against E-Prime", Summer, p. 175)

E-Prime makes no distinction between statements that cross the principles of general semantics and statements that do not. A statement such as, "I am going to the store," violates no formulation of general semantics, yet E-Prime prohibits it. That clearly places E-Prime **outside the interrelated set of principles and practices that constitute the discipline**. The first question we should ask of a principle or practice of general semantics is whether or not it fits the facts (and the other formulations of the system), not whether or not it is expedient. The map-territory paradigm, the verifiable premises of the discipline, the deliberately limited nature of Korzybski's formulations, all suggest that **we should not allow a practice that lacks consistency with the other tenets of general semantics into the system**. In my opinion, E-Prime goes way beyond the borders of what a discipline with scientific aspirations should tolerate.

A2: Marcuse (Acronyms Critique)

MARCUSE'S IDEAS STEM FROM A DEEP PARANOIA OF PROGRESS, AND A SENSE OF NOSTALGIA FOR SIMPLER TIMES

NEL, ASSISTANT PROFESSOR AT KSU, 2002 [PHILLIP, METAPHORS AND PORANOIA, MODERN FICTION STUDIES P. 480-485, PROJECT MUSE]

Timothy Melley would likely agree with what Don DeLillo wrote in an essay on the Kennedy assassination: "paranoia in some contexts is [End Page 480] the only intelligent response" ("American Blood" 24). Melley's Empire of Conspiracy investigates why and how paranoia has become a central metaphor of American fiction and culture during and after the Cold War period. Taking as its central literary figures DeLillo, Margaret Atwood, Kathy Acker, William S. Burroughs, Joseph Heller, Diane Johnson, and Thomas Pynchon, Melley's is an exemplary "cultural studies" text that grounds its readings historically, while extending analytical trajectories to post-World War II social critics, psychologists, and filmmakers. We learn, for instance, that William Whyte's Organization Man and Herbert Marcuse's One-Dimensional Man share an inability to recognize the ways in which they have been ideologically conditioned, even though Whyte advocates a Protestant work ethic! while Marcuse favors socialism. (For the record, Melley aligns himself with neither.) The central thesis of Melley's book is this: the "rise of conspiracy and paranoia as major themes in late-twentieth-century American culture" articulates fears about "changing social and technological conditions" and "new conceptions of human subjectivity" (44), and reasserts "the vitality of a more familiar and comforting model of self in response" (45)

MARCUSE'S CRITICIS, OF HOW WE COMMUNICATE IS INHERENTLY CONTRADICTORY, AND ULTIMATELY FORCES US BACK INTO NONSENSE

DEAN, PROFESSOR OF POLITICAL SCIENCE AT HOBART AND WILLIAM SMITH COLLEGES, 2001 [JODI, FROM TECHNOCRACY TIO TECHNOCULTURE, JOHN HOPKINF UNIVERSITY PRESS, PROJECT MUSE]

In his response to Marcuse, Habermas doesn't deny that instrumental reason is rational. His argument is rather that efficiency, instrumentality, is not the only form of rationality, and that the ideal of public deliberation provides another standard for assessing societal rationality. The consolidation of communicative and instrumental rationalities in the networked economy suggests otherwise. Today, communication is that which cannot be challenged, that which is presupposed as the measure, the end, the goal to be reached, the value to be maximized. To criticize communication seems a performative contradiction, a kind of irrationality, a lapse into precommunicative or noncognitive nonsense. Why shouldn't everyone be wired, turned on, tuned in? Why shouldn't we all have access, equal opportunity to get our views heard and hear the views of others?

STATE CONTROL OF LINGUISTIC PROPOGHANDA ONLY GOADS RESISTANCE TO THE SYSTEM OF ONE DIMENSIONAL THOUGHT

POMEROY, RICHARD STOCKTON COLLEGE OIF NEW JERSEY 2001 [ANNE FAIRCHILD, THE JOURNAL OF SPECULATIVE PHILOSOPHY, PROCESS PHILOSOPHY AND THE POSSIBILITY OF THE CRITIQUE, PRJECT MUSE]

This double fact of the simultaneous development of social practices with their non-conformal other and the alteration of reality by way of such conceptual entertainment, goes a long way towards explaining the necessity of the implementation of systems of propaganda, coercive advertisement, and media manipulation in unjust social regimes. As a given injustice becomes more evident, so does the entertainment of the possibility of its non-existence. It is expedient for the perpetrators of injustice to dominate and manipulate the inherited conceptual content. Examples of such control can and do occur in numerous ways. The media can co-opt the formal possibilities in its own conceptual frameworks, as Marcuse says happens with political and social assimilation; 13 or they can present the social reality as already meeting the needs of anticipatory consciousness, as occurs with the spectrality of advertising; or they can simply control the availabili! ty and content of information, as occurs with "brainwashing under freedom" and the "manufacture of consent." 14 The good news from the process standpoint is that such control must necessarily be, in the long run, unsuccessful. It can serve only to goad the increase of its presented alternatives:

A2: Marcuse (Acronyms Critique)

MARCUSE'S TOTALITARIAN CENCORSHIP JUSTIFIES SENSELESS VIOLENCE, AND DOES NOTHING TO CHANGE THE UNTHINKING NATURE OF HUMANS

YEGULALP, FREELANCE JOURNALIST, 2002 [SERDAR, http://www.thegline.com/thought/2002/03-20-2002.htm, GET YOURMJACKBOOTS OFFA MY NECK]

In short, Marcuse basically planned to substitute one variety of tyranny for another. The tyranny of "repression," nebulous as it was -- which he quantified in wonderfully vague terms that could be applied to a broad variety of social contexts that didn't deserve them -- was substituted for the tyranny of correct, liberation-oriented thinking. I don't think it's an exaggeration to say that Marcuse's ideas are at the root of a good deal of the politically-correct drivel that has crippled intellectual discourse in this country and set it back by a good thirty to forty years.

Marcuse's words were used to fuel the justifications of everyone from the SDS (who wanted, despite their moniker, anything but a democratic society) to the Black Panthers. Everything that was an attack on "repression" was justifiable in the long run. By extension, Western society was the biggest repressive tool of them all, even when the people making this claim had to resort to distorted research to buttress it. No intellectually decent study of civilization can ignore the wars and violence that men have dealt out against men the world over. I find it ironic that the greatest broadsides against intellectual discourse in the West were being launched at the same moments that it was finding itself freer of humbug and backwardness than it had been in ages.

MARCUSE'S BELIEFS THAT THE ESTABLISHMENT HAS EASIER ACCESS TO THE MDEIA MEANS THAT THE LEFT WILL NEVER BE ABLE TO EXPRESS THEIR VIEWS IN A WORLD WITIHOUT FREE SPEECH

TREMOGLIE, FREELANCE WRITER AND EX-COP, 2003,

[MICHAEL P. , THE ORIGIN OF THE DOUBLE STANDARD, http://www.americandaily.com/article/2755.]

Marcuse proffered a similar concept about free speech. He felt that free speech only served to reinforce the status quo since the Establishment had better access to the media then progressive groups. For this reason Marcuse believed that whites in America should not have the same rights of free speech as minorities because that would just ensure the maintenance of the status quo.

THE USE OF ACRONYMS IS NOT NECESSARILY BAD; IT DEPENDS ON THE CONTEXT THAT IT IS DEPLOYED IN

MARCUSE 1964

[HERBERT, ONE DIMENSIONAL MAN, ACCESSED AT http://www.marcuse.org/herbert/pubs/64onedim/odm4.html]

Where these reduced concepts govern the analysis of the human reality, individual or social, mental or material, they arrive at a false concreteness-a concreteness isolated from the conditions which constitute its reality. In this context. the operational treatment of the concept assumes a political function. The individual and his behavior are analyzed in a therapeutic sense-adjustment to his society. Thought and expression, theory and practice are to be brought in line with the facts of his existence without leaving room for the conceptual critique of these facts.

The therapeutic character of the operational concept shows forth most clearly where conceptual thought is methodically placed into the service of exploring and improving the existing social conditions, within the framework of the existing societal institutions-in industrial sociology, motivation research, marketing and public opinion studies.

If the given form of society is and remains the ultimate frame of reference for theory and practice, there is nothing wrong with this soft of sociology and psychology. It is more human and more productive to have good labor-management relations than bad ones, to have pleasant rather than unpleasant walking conditions, to have harmony instead of conflict between the desires of the customers and the needs of business and politics.