# Propositional Calculus – Part 2: Proofs

# Paper Towel Wars

It is odd to say that I stumbled onto this topic by simply waking up one morning but that is the actual way it began. More precisely, it began with a half-awake, half-witted attempt to listen to the morning show that my wife and I favor. The topics include a smattering of current national politics interspersed with interesting local stories, human interest tales, and other items meant to amuse or outrage or otherwise energize the listener to a brand new day.

This particular day, only about a week ago, one of the hosts was reveling in the scientific study that concluded that paper towels in public restrooms were the best choice for hygiene. The show was flooded with numerous callers all clearly falling into one of two camps: those for paper towels and those for hand dryers. There seemed to be no middle ground. Suddenly I was aware of a great and terrible debate that had been raging all around me to which I was hideous oblivious – the paper towel wars.

It seems that the argument over which method was best is so pervasive that all one needs to do is to start typing

< paper towels ver>

to get a Bing or Google autocomplete to come back with

< paper towels versus hand dryers>.

And judging by the articles that turn up, this debate has stewed for some time and it is typically very polarizing with most people pitching their loyalty with one side (hand dyers) or the other (paper towels). Sharp are the lines between these two camps and strong are the passionate claims that each makes about the advantages it has over the other.

Consider the pro paper towel camp. Washington Post contributor Alexandra Petri minces no words ([The paper towel-hand dryer wars are over](https://www.washingtonpost.com/blogs/compost/wp/2012/12/14/the-paper-towel-hand-dryer-wars-are-over/)) when it comes to the paper towel side. She likens the clash between the two camps to the old feud between the Hatfields and the McCoys and claims that, at least in this case, the “correct team has won.” Citing the 2012 Mayo Clinic study entitled [The Hygienic Efficacy of Different Hand-Drying Methods: A Review of the Evidence](http://www.mayoclinicproceedings.org/article/S0025-6196%2812%2900393-X/fulltext#sec2.4.1), Petri gleefully brings ‘science’ in to support the conclusion that paper towels are the correct choice. In her reading, hand dryers are ineffective and unhygienic and near the close of her article, she presents this gem of a paragraph

<No, the science is in. And there’s absolutely no excuse for them [hand dryers]. If anyone ever comes up to you and tries to argue that hand dryers are just as good as paper towels, slap him with your damp and bacteria-ridden hand. In fact, I’m not sure what we were doing with hand dryers in the first place.>

To bolster the pro-paper case even more, News Max reported a follow-on story in June of 2015 entitled [Paper Towels vs Air Dryer: Which Gets Rid of More Hand Germs?](http://www.newsmax.com/Health/Headline/hand-drying-paper-towels/2015/06/21/id/651565/) Citing Dr. Philip Teirno, a professor of microbiology and pathology at the New York School of Medicine, the article concluded that paper towels offer a better alternative to hand dryers since the direct contact friction is an essential ingredient in eliminating germs from the hands after washing.

But the pro hand drying camp is not without its scientific studies, which conclude, oddly enough, that hand dryers are the correct choice. RestroomDirect, a company specializing in the distribution of hand dryers and commercial restroom cleaning supplies asks [Which is better in a commercial restroom? Hand dryers or paper towels?](http://www.restroomdirect.com/hand-dryers-vs-paper-towels.aspx) They present a strong, and no less scientific, argument that hand dryers are far more energy and resource efficient thus making them better for the environment. Hand dryers are also far less expensive to operate meaning that businesses can put additional resources towards more important things. To add fuel to the fire, there is also a scientific study from the University of Buffalo ([Paper towels fold in study versus hand dryers](http://www.buffalo.edu/news/releases/2014/06/010.html) 6/14/14) that concludes that paper towel dispensers are actually far more unhygienic than hand dryers.

To make matters even more confusing there is even a YouTube video that attempts to scientifically weigh in with the pros and cons of both approaches

<iframe width="560" height="315" src="https://www.youtube.com/embed/2g4fWaegoDk" frameborder="0" allowfullscreen></iframe>

Pros and cons. Competing and contradictory scientific studies. So what is a consumer to do?

This situation is representative of the classic conundrum that occurs in the market place. The correct economic choice may be apparent if perfect knowledge were present, but consumers almost always have to make choices based on information that is far from perfect.

This lack of knowledge drives many of the hedges and securities mechanisms that decorate our day-to-day market interactions. Uncertainty and doubt set premiums on life, car, and homeowners insurance. Hedge funds sell guards against market downturns, sudden jumps in stock prices, and other forms of volatility. Interest on loans are a way of protecting against future inflation and rewarding delayed gratification.

Much in our economic lives is shaped by uncertainty as to what the future holds and how to make the best choice with limited information. We see it every day but it is rare to see it as cleanly laid out as it is in the paper towel wars.

# Consistency Matters

This past Sunday I had the pleasure to sit in on a round-table discussion about comics in general and the recent Secret Wars storyline in particular. This book discussion was put on by a local shop by the name of [Third Eye Comics](http://www.thirdeyecomics.com/), which has locations in Annapolis and Lexington Park, Maryland.

For those who have never visited Third Eye, it is series of three stores; two of them (Annapolis and Lexington Park) are focused on comics, manga, collectibles, and the like. The third store (also in Annapolis), which is devoted to gaming, sports an eclectic mix of games, including the usual European board games (Catan, Ticket to Ride, Princes of Florence, etc.), collectable card games (Magic: The Gathering, Pokémon, etc.), and more specialized franchises like Warhammer and Dice Masters.

The book club was held after hours in the common area of the gaming store. This type of discussion was the first of its kind that I ever attended and, I believe, the first such event that Third Eye held. And before I share my impressions, I would be remiss if I didn’t mention that the Third Eye staff were quite hospitable. They brought in food and refreshments, provided swag, and were welcoming and engaging.

I wasn’t quite sure what to expect from this experience. As I’ve [written elsewhere](http://aboutcomics.blogwyrm.com/?p=544), my exposures to panel discussion at comic cons have left me with a bad taste. But the conversation was here was different. The mood was relaxed but respectful and everyone acted as and were treated as human beings.

While the majority of the discussion was on the *Secret Wars*, it was inevitable that other topics were introduced. Comparison and contrast with other mega-series brought in conversation points from DC’s numerous *Crisis* events. In the same vein, Hickman’s work on *East of West* was also touched upon if for no other reason than to note the differences in his style when he is creating his own work rather than interpreting the properties of others.

But the most interesting component was when the group started looking at the various *Battleworld* spin-offs and companion series that went on during the whole reboot of the Marvel Universe. I only followed two of the numerous satellite series: Infinity Gauntlet and the Ghost Racers, and it didn’t really enjoy them. Apparently my experience was not reflective of the rest of the group and their experiences, especially with Weird World, were quite positive.

And it was out of this discussion that I actually learned the most interesting point of the evening – consistency really matters to most readers. I’ve always cared about consistency but I didn’t really have a sense of how much anyone else does. If book club discussion is a guide, the answer is quite a bit. Admittedly, this conclusion is not based on a statistically valid sample size with a carefully crafted questionnaire delivered in a well-designed double-blind fashion. It is based on common sense and on listening to what was said and how it was said and how often.

Perhaps the most intriguing part was when the mechanics of ‘healing factors’ were explored. The trigger for this discussion is very amusing side moments in Secret Wars when Mister Sinister loses his head, which then gets knocked around for a while like some demented sort of soccer ball.

The group started to wrestle with just how does the how thing work. Take, in particular, Deadpool. If he has his hand cutoff, does it grow back? If it does, does the severed hand grow back an entire Deadpool. Clearly this isn’t the case since there aren’t numerous Deadpools running around, but why not? How does Deadpool compare to Wolverine? Where does the energy come from to do all this?

This line of questioning shouldn’t be dismissed as the idle musings of a fanboy. Rather these are the normal trains of thought for intelligent minds trying to understand the world around them. These are the sort of questions that lie at the heart of scientific inquiry. True they deal with a fictional world constructed, only partially, by men but the point is this. Reading comics (and reading in general) may be an escape but the escapee take his reason and his sense of cause-and-effect with him. The writer would do well to pay more attention to consistency. It matters – just ask Mark Gruenwald.

# Knowledge and Uncertainty

The disciplines of the natural sciences and philosophy enjoy a rich, complicated, and, at times, subtle relationship. Philosophic pursuits help to guide and inform the scientific enterprise while the phenomena, which science discovers, categorizes, and explains, expands and grounds the philosophic thought. Nowhere is this interaction more interesting and, perhaps, more important than in the area of knowledge and uncertainty.

Epistemological ideas dealing with what is knowable, unknown, and unknowable have played a large role since the earliest days of philosophy. In the Platonic dialog [*The Meno*](https://en.wikipedia.org/wiki/Meno), Socrates puts forward the idea that much (or perhaps all) human learning is really a kind of remembrance of knowledge attained in past incarnations of the soul ([anamnesis](https://en.wikipedia.org/wiki/Anamnesis_(philosophy))). How exactly the cycle starts and what knowledge the proto-soul possesses or whether Plato/Socrates actually worried about an infinite regress is not clear.

Questions of knowledge continue on for thousands of years without much of a change in the focus or tenor until the rise of quantitative scientific methods in the post-Renaissance world. Almost overnight, there is now a way to discuss three vital components of knowing, at least within the context of physical systems:

* Knowledge characterized by measurement
* Uncertainty characterized by error
* Mathematical description of how the two propagate their influence

These new ingredients are not developed to shed light on ages-old debates but rather to determine just how to deal with these new models of the physical world – differential equations. In differential equations, man had an operational model for cause-and-effect; a laboratory wherein the ideas of what is known and unknown/unknowable could be made the subject of experimentation. Nature’s own fabric helped to shape and mold how mankind saw knowledge.

These ideas matured in many different directions subject to need and taste. The three most interesting ones are:

* Control theory
* Quantum mechanics
* Statistical mechanics

In control theory, the basic notion is one of a state whose evolution is subject to a set of differential equations that describe the influence of the natural environment and the man-made controls used to guide the evolution into a desired behavior. The physical world is divided into pieces known and unknown. Generally, the known pieces are considered to be deterministic and the unknown pieces are random. The random variables are assigned probability distributions that describe what sort of state realizations can occur and how often they are likely to come on the scene. Sometimes, there is a further division of the random variables as either being aleatory or epistemic. The former term, aleatory, is best described as saying the randomness is somehow intrinsic to the system being modeled. In contrast, the latter term, epistemic, refers to randomness that is due to lack of measurement precision. The errors in the knowledge of the initial state of a system is often thought of as epistemic while the uncertainties in the evolution of the differential equation is often thought of as aleatory. The distinction being that the initial state knowledge may be improved by better measurements while the evolution model for the system, the so-called right-hand side of the differential equation, will never be able to accurately represent the true dynamics due to random fluctuations in the forces that cause the motion.

Generally, the control system community does delve too deeply into the ontological nature of these uncertainties, contenting themselves with the need to operationally model them. And this approach is reasonable since it isn’t nearly as important to understand where ‘noise’ comes from as it is to determine how to deal with it.

Nonetheless, the very concept of noise and randomness and the study of how they arise can guide the techniques used to control and mitigate their presence. This is where the two disciplines in physics, statistical mechanics and quantum mechanics, shine.

These two disciplines are, properly speaking, two sides of the same coin, but it is often convenient to separate out the randomness into two separate bins, one dealing with the quantum nature and the other with the many-particle nature of the system being studies. Although the terminology is rarely used by physicists, the descriptions of aleatory and epistemic fit these bins nicely, at least at the conceptual level. However, hard pushing on these concepts will soon show that the divisions are not as clear cut as they might first appear.

First, consider quantum mechanics. By the very nature of the quantum wave function, the state of a system at any time cannot be determined with infinite precision; so a complete knowledge of conjugate pairs of variables (e.g. position and momentum) is impossible. In some sense the system is aleatory. But the evolution of the wave function is mediated by the Hamiltonian, whose nature is considered known. The state evolution is completely deterministic and the only insertion of randomness comes in the measurement step, where the wave function collapses into an eigenstate of the measurement Hamiltonian. Thus the measurement process is aleatory but this randomness can be used to an advantage since the initial state of the system can be prepared so that it is perfectly an eigenstate of the measurement Hamiltonian and hence has no state uncertainty.

Statistical mechanics deals with the added complication of having an enormous number of degrees of freedom (e.g. many particles) so that a complete description of the state is practically impossible. (It is interesting to note that not all systems with enormous or even infinite degrees of freedom are intractable; the common field theory – say the wave equation – has an infinite number of Fourier modes that all behave in a describable fashion.) In classical statistical mechanics, the state of the system is not limited by the uncertainty principle. So the specification of the initial state is probabilistic only due to our ignorance, thus it is epistemic. Since tracking separate their individual motions, and hence their interactions, is also intractable, the evolution is subject to ‘noise’ but of an epistemic nature as well; since in principle, if the individual states could be tracked (e.g. on a computer), then complete state knowledge would be possible.

Statistical mechanics becomes richer when combined with quantum mechanics. The initial state of the system can be statistically distributed across multiple eigenstates. For example, 10 percent of the system can be in one quantum state while 90 percent in another. The density matrix formalism is designed to handle the case where epistemic uncertainty is layered on top of aleatory uncertainty.

All this is well and good but things become complicated when these concepts are pushed to their logical boundaries by asking some ontological questions about the nature of uncertainty. The most intriguing question deal with the boundary between the epistemic and the aleatory. Many researchers are fascinated with the idea that the aleatory uncertainty of quantum mechanics may give way to hidden variables, pilot waves, and the like. The unspoken goal is eliminate or, otherwise, get around the uncertainty principle. But the more interesting question flows the other way. Is our ignorance a physical manifestation of aleatory rather than of epistemic uncertainty? Buried deep under these distinctions is the notion of a human who can possess knowledge of the physical world; an observer in the language of quantum mechanics. But no matter how the knowledge possessor is names, it is still a physical object. Its knowledge is represented by physical patterns of matter and energy. Its ability to measure and interact are still mediated materially. So where does the actual boundary lie? Just how separate is the measurer from the measured? The answer is, to close with a pun, completely uncertain.

# Logic and Cause & Effect

There is a famous scene in the movie *All the President’s Men* where Bob Woodward (played by Robert Redford) and Carl Bernstein (played by Dustin Hoffman) are struggling to see if they have enough facts to continue to publish their stories about Watergate. As they are driving along, they start to discuss what they can ‘deduce’ from what they already know. Woodward essentially says that they can infer what they need circumstantially. He defends this position with a discussion about logic and cause and effect.

<insert clip>

In essence, what he says is that if you look out your window before you go to bed one fine, cold winter night and the ground is snow free and you wake up the next morning to see a winter wonderland of white all around you can conclude that is snowed overnight, even if you didn’t see it. Simple application of cause and effect, it seems. But arguing for causes by observing effects can be tricky since causes are often elusive even though their effects are quite observable.

Consider the basic demonstration of gravity. Hold an object up and the let go. The effect is clearly observable; the object falls to the ground. The cause, on the other hand is quite mysterious. Just what is gravity? None of us can feel it or see it or sense it in anyway. The word gravity is just a name we give to this cause. The genius of Newton gave us a way to match the nature of the effect (distance and speed as a function of time) to the geometry of the situation (where the object is in relation to the Earth) but he didn’t really explain it. Neither do the modern explanations of gravity as spacetime bending or the exchange of gravitons do anything other than to explain one mysterious concept in terms of others (which, granted, provide a more complete way of predicting the outcome).

The situation becomes substantially more complex when the several causes can be present all of which result in a particular effect. It’s no wonder that misapplications of cause and effect abound even outside the realms of science. Sometimes this leads to amusingly bad arguments; sometimes the results are more frustrating and thorny.

At the heart of the logic of cause and effect is the idea that if a cause, call it $$P$$, is present, then its effect, call it $$Q$$, must follow. Symbolically, this linkage is denoted by $$P \rightarrow Q$$, which is the familiar construct of propositional logic that was discussed in this column in earlier postings.

The question is what can be said about $$P$$ based on an observation of $$Q$$ or vice versa. The four options are:

* Observe P and infer something about Q
* Fail to observe P and infer something about Q
* Fail to observe Q and infer something about P
* Observe Q and infer something about P

The usual names for these options and their logical validity are summarized symbolically in the following table.

|  |  |  |
| --- | --- | --- |
| ***Argument Name*** | ***Argument Form*** | ***Validity*** |
| Modus Ponens |  | Valid |
| Denying the Antecedent |  | Fallacy |
| Modus Tollens |  | Valid |
| Affirming the Consequent |  | Fallacy |

This innocent looking table can lull one into thinking that good arguments are easily sifted from the bad ones and this expectation would be correct – for simple examples. Bo Bennett’s website, [Logically Fallacious](https://www.logicallyfallacious.com), has hundreds of examples of all sorts of fallacies both formal and informal. These have been specially crafted to make detection of the fallacy nice and easy. Often they are also fun to read and some are laugh-out-loud funny.

I don’t have nearly the same devotion to cataloging fallacies nor do I have the same sense of humor as Dr. Bennett so I will stick to some easy examples first of the meteorological type began with above. I’ll then look at just where things go awry and I’ll emphasize that, for things to move forward, we often have to ‘embrace the fallacies’, specifically affirming the consequent.

Suppose that you look at the window and you see that it is raining. Literally, you are seeing water come from the sky and hit the earth. Furthermore, you can readily see that when the water strikes it wets the ground. Through observation, you’ve determined the causal link that ‘if it is raining then the ground is wet’. The clauses ‘it is raining’ and ‘the ground is wet’ abbreviate to $$P$$ and $$Q$$, respectively.

With this fact established, you know longer need to directly observe the ground during rainfall to know it is wet. If someone else, say a morning weather report, tells you that “it is currently raining in the metropolitan area” then you can immediately deduce that the ground is wet. This valid deduction is the content of Modus Ponens.

But what can you do with other observations? That is the key point since often, as argued above, observing the cause is very difficult (more on this in a bit).

Well, Modus Tollens tells us that if we were to observe that the ground is dry then we can immediately deduce that it is not raining. I personally use this ‘trick’ whenever the day is hazy or foggy and the rain, if there is any, is too fine to be seen or heard. If the ground looks dry then it isn’t raining.

However, if the ground is wet I am stuck and my deductive chain fails. The reason for this is obviously the fact that the ground could be wet for a bunch of other reasons. Maybe it snowed overnight but melted before I made my observation. More probably, my neighbors may have watered their lawns in the early morning hours with those automatic, beneath-the-ground systems that have proved most popular in my neighborhood. Observing that the ground is wet (Affirming the Consequent) merely tells me that one of several possibilities was the cause.

This same line of argument also leads us to reject the conclusion that the ground is not wet when I observe that it is not raining (Denying the Antecedent). Again, several causes can lead to the same effect so the absence of a single cause does not support the conclusion that the effect is also absent.

Now all of this sounds neat and tidy but the world is never so clear cut. Linkage between cause and effect is difficult to observe completely and, in many cases, the cause can’t be observed directly. For example, if I observe that the ground is wet but I can’t see it raining, I may still be able to conclude that it is even though I would be committing the formal error of Affirming the Consequent. I would do this in a probabilistic fashion where I would argue that the other causes are very unlikely. Perhaps, the street in front of my house is wet in way that would be unlikely due to water sprinklers alone. Or maybe it is summer and the likelihood of snow is small. As compelling as these arguments may be, a water main break out of my line of sight may explain everything.

Despite the fact that this rainfall example is contrived it captures the essence of the natural sciences. Medicine, in particular, is plagued by this kind of uncertainty. A patient comes in with an effect, say a fever, and the cause is unknown. Literally hundreds of causes exist and one of the tasks set before the doctor is to infer the likeliest cause and start there. Each and every day, medical practitioners violate Affirming the Consequent – they need to since inaction is often far more dangerous than action based on a wrong conclusion. The key is not making the inference but rather having the wisdom to know when to abandon that inference and to make a new one.

This type of statistical reasoning is not limited to the STEM professions. Each of us deals with unseen or poorly observed causes and effects that may have many parents each and every day. Each of us must embrace formally fallacious reasoning just to be able to move forward.

So the next time you see someone employ one of these fallacies in a manner obvious to you and are inclined to reject their argument just remember two things. First he may not be able to see cause and effect as clearly as you do. Second, perhaps he knows something you don’t and it is you who are not seeing cause and effect clearly. In either case, certainly reject abject certainty in the conclusion but try to have compassion for the arguer. After all, making conclusions about cause and effect, even the cause and effect of a bad argument, is a difficult job.

# Tale of Two Koreas

I had an occasion to visit the Republic of Korea, aka South Korea, this past month and I thought I would provide an on-the-ground style reporting of my observations and impressions and contrast these with what little is known about the Democratic People's Republic of Korea that inhabits the northern portion of this peninsula.

Before I get into details, a side-by-side comparison between South Korea, North Korea, and the United States seems appropriate for those, like me, who know very little of one or both of these north-east Asian countries. The following table contrasts geographic and economic statistics between the two countries (all information taken from the corresponding entries in Wikipedia accessible by the links provided).

|  |  |  |  |
| --- | --- | --- | --- |
|  | [South Korea](https://en.wikipedia.org/wiki/South_Korea) | [North Korea](https://en.wikipedia.org/wiki/North_Korea) | [United States](https://en.wikipedia.org/wiki/United_States) |
| Area (km2) | 100,210 | 120,540 | 9,857,306 |
| Population | 51,529,338 | 24,895,000 | 322,369,319 |
| GDP (trillion $USD) | 1.392 | 0.0154 | 18.124 |
| Per Capita Income ($USD) | $27,513 | $621 | $56,421 |
| Adjusted Per Capita Income ($USD –[PPP](https://en.wikipedia.org/wiki/Purchasing_power_parity)) | $36,528 | $1,800 | $56,421 |
| [Gini Index/Coefficient](http://commoncents.blogwyrm.com/?p=83) | 30.2 | N/A | 40.8 |
| [Human Development Index (HDI)](https://en.wikipedia.org/wiki/Human_Development_Index) | 0.898 | 0.766 | 0.915 |

Statistics being statistics, some words about them are required to set the proper context.

First of all, the two different values for per capita income reflect two different perspectives on income. The first is simply the ratio of dollars to population (i.e. $18.124 trillion/332,369,319 = $56,221 per capita – allowing for rounding and finite precision). The second is adjusted to reflect differences in cost of living to bring all countries to purchasing power equal to a US citizen (purchasing power parity); this explains why the values for the two entries are identical in the US column.

Second, the Gini Coefficient (which has been discussed in [detail in an earlier column](http://commoncents.blogwyrm.com/?p=83)) is one measure of income distribution and, although it often [hides important details about structural or temporal differences](https://en.wikipedia.org/wiki/Gini_coefficient#Limitations_of_Gini_coefficient), is frequently used to gauge how equitably the income is distributed in a country. The values range from 0 to 100 for the index (0 to 1 for the coefficient), reflecting completely even distributions or totally inequitable ones, respectively. A correctly functioning, free market economy should have a nonzero index value somewhere below 50. Note that the index doesn’t reflect wealth simply the income distribution, so that a poor country may have a lower index than a richer one, or a smaller more homogenous population may have a smaller index than a larger, more diverse one.

Third, the Human Development Index is a composite measure of the life expectancy, educational achievement, and income distribution (Gini again) components of a society. While there seems to be some high powered thinkers behind the genesis of this index, I personally find it uninformative since the range for the top 50 countries was between 0.802 (Montenegro) to 0.944 (Norway) and high human development is considered to be 0.7 and above. Nonetheless, it is a measure that policy wonks use so it is useful to pay attention to it, even if only to refute it. Note that it seems impossible to find the HDI for North Korea but I’ll argue later that it can’t be very high.

I didn’t know what to expect from South Korea beyond the sorts of ‘rumors’ that any attentive citizen of the US hears – namely that they make some fine automobile lines (e.g. Hyundai and Kia) and that online video gaming is a passion and that many of the world’s best live on Red Bull and Cheetos and hang out in internet cafés looking to ‘pwn nwbs’.

After over a day of travel by car, plane, train, and taxi, I finally arrived at the city of [Daejeon](https://en.wikipedia.org/wiki/Daejeon), which is, more or less, situated at the middle of the country. What I found was a vibrant, bustling economy with a modern infrastructure.

Several waterways slide through the city flowing north-south. One the bank of one of them is the Daejeon Convention Center surrounded by a host of tourist attractions, including a golf emporium and a performance hall.



On the other side was downtown Daejeon proper with tall buildings, wide, bustling streets.



A wonderfully architected foot bridge spanned the two banks, providing a really attractive landmark for the walker, runner, or cyclist (many, many, many of these).



Almost everywhere I went there was modernity and construction.



Sometimes the urban arrangement was brand new and well order. Sometimes it was grafted onto older slices of Korea – narrow streets, old shops, packing crates just outside. In all cases, people seemed to have enthusiasm and purpose and, most importantly, choice.

The influence of globalization was to be seen, most notably in the form of 7-11



and

Dunkin Donuts



But the need for nature of green space was not ignored. Indeed, within the heart of a city was a large, well-groomed park that boasted an arboretum. A small but steady flux of people entered and left the park during the day, lingering and relaxing.



Daejeon plays host to many of the governmental entities, including the Korean Aerospace Research Institute (KARI), the country’s analog to NASA, and Statistics Korea (KOSTAT), an arm of the Ministry of Strategy and Finance, the Korean amalgam of the Bureau of Labor Statistics, Bureau of Economic Analysis and, no doubt, a bunch of other Bureaus and Agencies here in the US.



The South Korean government seems to take the promotion of economic growth, the development of high-tech infrastructure, and the health and well-being of their citizens seriously.

In contrast, the most charitable thing I can say about North Korea is that its government doesn’t. The only picture I can offer is the famous image of the Korean peninsula at night, taken from the ISS.



Note the dynamic nature of South Korea; the intense lights dotting the country with a veritable explosion of brightness surrounding Seoul. Note the substantial development even in China. It’s hard to believe that there is actually a land mass connecting the two, upon which North Korea stands. Alas, the Hermit Kingdom doesn’t provide infrastructure, or choice, or often even ample food for its population. The human development index for North Korea must be near the bottom of the list is not completely off the scale in the worst way.

It is interesting to see how this one picture the spectrum from full free-market to full centrally-controlled economies plays out for the entire world to see. Hopefully this photograph will find its way into all textbooks as a concrete lesson on the positive things that can happen when people are free to choose.