Mathematics, Science and Ethics

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It is often said that science and ethics are separate, or that science should be subsidiary to ethics (e.g. by having scientists avoid research with bad applications or consequences), but I want to ask:

• What positive contributions can science and math make to setting ethical values? Can they be used to arrive at less anthropocentric notions of good and evil?

• Can they help negotiate difficult policy questions, where attaining one good seems to require sacrificing another, and where the intensity of people's beliefs exceeds their ability to persuade one another?

Difficult tradeoffs

• Security vs. Liberty — *Surveillance cameras in public places*

• Traditional vs. Rational/Secular — *Ten Commandments vs.*
"Whatever floats your boat and doesn't sink mine"

• Universal Human Rights vs. Respect for Indigenous Customs —
Female genital mutilation, a.k.a. female circumcision

• Natural vs. Artificial — *organic vs. genetically modified*

• Global vs. Local — *made in China vs. made in Sunderland*

In the US, these questions often get shoe-horned into a single left-right spectrum, an approach which Ambrose Bierce made fun of when he defined *"conservative"* as *"a statesman who is enamored of existing evils, as distinguished from the liberal, who wishes to replace them with others."*

Worldwide, the situation is more complicated: e.g. Russians typically have less respect for traditional/religious values than Americans, but are also more willing sacrifice liberty for security.

U. of Michigan World Values Study, national differences
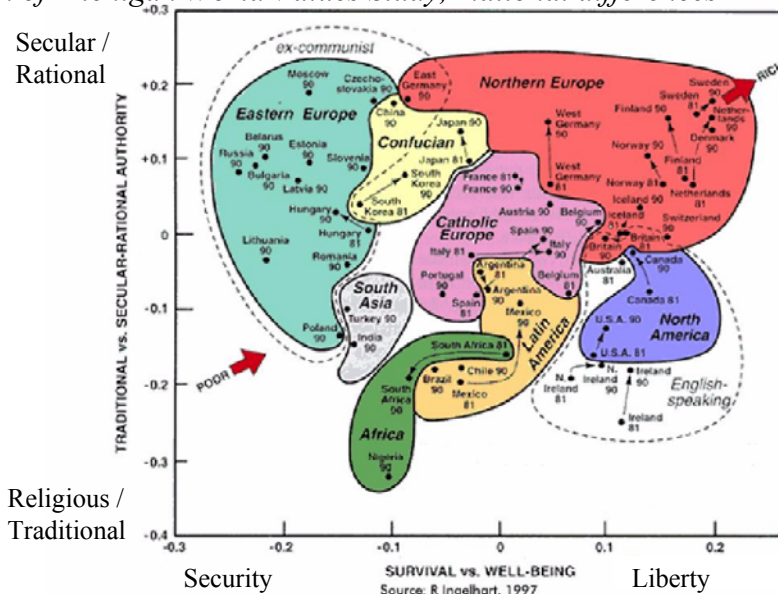
Broadly, wealth is associated with liberty and secularism, but the US and Ireland are the religious though rich, while post-communist societies are secularist though poor.

**On the Security vs. Liberty tradeoff,
technology has created a problem and an opportunity**

Cheap, easy-to-use video cameras and cheap data storage leads to the temptation to record everything happening in public or even private venues and save it forever, with ensuing loss of privacy, and potentially a loss of liberty if a present-day J. Edgar Hoover gets the data.

But these recordings are sometimes good, protecting individual rights, e.g. Rodney King, war crimes evidence, polluters.

In many situations the bad guys want privacy and the good guys want publicity, with authenticity.

Maybe we should have have laws allowing anyone to make A/V recordings in any public place, but restricting how the recordings can be used (e.g. Yes for whistle blowing, No for blackmail).
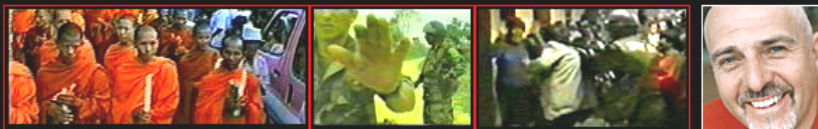*A Second Amendment for the Fourth Estate.*

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http://www.witness.org

About WITNESS
"WITNESS empowers people to record injustice as it happens, and makes us all eye WITNESSes to human rights violations"

Peter Gabriel
WITNESS Co Founder

· Acerca de WITNESS (Español)
· À Propos de WITNESS (Français)

Made you look

WITNESS is a human rights program that attracts the eyes of the world and inspires those who see - to act.

WITNESS strengthens local activists by giving them video cameras and field training.

Today, WITNESS unleashes an arsenal of computers, imaging and editing software, satellite phones and email in the struggle for justice.

A picture is worth a thousand words

In 1991, a bystander with a video camera captured the Rodney King beating in Los Angeles. The videotape shocked millions and showed that human rights abuses are worse when violators aren't afraid of detection.

But not everything you see a picture or video of,
or hear a sound recording of, really happened.

See for example the "world's shortest vacation"
video widely available on the Web, in which a
shark leaps up and eats a diver in mid-air.

Problem: Can such Video Evidence be Trusted?
Audio and video recordings are easily doctored, and seemingly
cannot be trusted unless they have been continuously in trusted
hands from the moment of generation. Those making the
recordings often have a vested interest and may be distrusted by
the public. In the O.J. Simpson trial, many people believed the
police had falsified videotapes and other evidence.

Solution:
1. Produce the recordings in a way that prevents falsification even
by the makers and operators of the recording equipment (Practical
techniques exist to do this—see me after class).
2. Establish the societal expectation of such an authenticated
recording under certain circumstances (e.g. police arrests and
interrogations), so its absence will be seen as evidence that the
responsible authority has destroyed it. In many places, both
communities and police support cameras on police cars and
during police interrogations.

Back to the Traditional vs Rational/Secular divide.

For traditionalists, anthropocentrism, or maybe even ethnocentrism, is not a bad thing. For rationalists any type of centrism is suspect.

Who should have rights (and what kind): Foreigners? Enemy Combatants? Children? Embryos? Animals? Plants? Robots?

The abortion issue typifies Traditional vs. Rational/Secular divide in the US: traditionalists take human life as the essential thing, irreducible to other notions; rationalists distinguish between an actual and a potential person.

"Mineralarians" would protect all life from human predation.

The Mineralarians

Science has given us ever increasing control over nature, but this awesome ability has not been accompanied by any noticeable increase in the kindness with which we treat our fellow passengers on Spaceship Earth. Quite the contrary. To the hunter-gatherer, hunting was a holy act, often accompanied by an apology to the prey. But we, who do not need to kill to survive, kill anyway on a vast scale, treating our victims with the anonymous disrespect of a high-altitude bombardier.

Can we avoid this cruelty? Many thoughtful people have embraced some form of vegetarianism, but that is only a partial solution. Modern biochemistry and genetics have proved beyond doubt the interrelatedness of all living things: we are scarcely less related to the wheat or the yeast in a loaf of bread than to our fellow animals. We can no longer pretend that these life forms are not our kin, nor can we rationalize our mistreatment of them by saying that plants, fungi, and microbes are incapable of suffering. The instinct to avoid pain and noxious stimuli, and the restless search for favorable conditions, which Thomas Jefferson called the pursuit of happiness, are as universal among living beings as their DNA.

The Mineralarians

If we refuse to eat our relatives, what *CAN* we eat? Fortunately, the same science that reveals our kinship to all life has freed us at last from the need to kill. Although most people are surprised to hear it, it is possible to live and thrive on a diet consisting entirely of foods of **mineral** origin. This is because every one of the several dozen nutrients the human body requires - carbohydrate, amino acids, fats, vitamins, and of course minerals - can be synthesized or extracted from air, water, and rock without the involvement of any life form, aside from the chemists who perform these life-saving syntheses. Human metabolism picks up where our chemists leave off, transforming these nutrients into the thousands of substances required by life.

The Bad News. While there is no doubt of the wholesomeness of a mineralarian diet, the same cannot be said for its taste and texture. But we were not put on this earth simply to satisfy our appetites. Mineralarians find it a small sacrifice to forego the delicious cruelty of "natural" food in furtherance of a greater good.

Can science and mathematics help provide a less anthropocentric definition of good? That would further the secular/rational quest of purging ethics of all kinds of centrism.

One idea: use science to explore and characterize nature, and identify natural as good, artificial as bad. But we humans are certainly a product of nature, and so is everything we make. Do we really want to favor nature's older products over her newer ones?

"If God had intended us to fly, He would never have given us the railroads".

Do we want to honor the creations of all species but one?

(My wife dislikes beavers because of their human-like destructiveness, but I am fascinated by them.)

Can science and mathematics help provide a less anthropocentric definition of good?
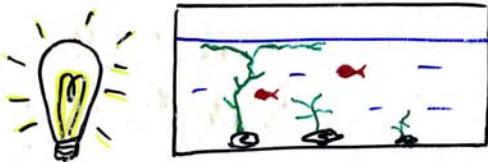
Another idea: Use mathematics to define complexity, and identify that which is complex, or hard to replace, as valuable. A good deed would then be one that increases the complexity of the universe, building something that would be hard to replace if destroyed.

A simple cause can have a complicated effect, but not right away.

Much later

What is Complexity?

- Ability to grow, reproduce, metabolize 🌳 ; Fitness 💪
- Randomness 1011001000100111010111
- Order ▦ """""""""""""""""
- Free Energy 🔋 E⟨T⟩F
- Information, Correlation 📖 🔍
→ • Logical Depth — internal evidence of a long and eventful history.
- Hierarchical Structure ●
- Computational Universality 10111011
  ∴

To take a simple example, here is a simple determinstic process
(a 1-dimensional cellular automaton) that produces a
complicated effect from a simple cause.
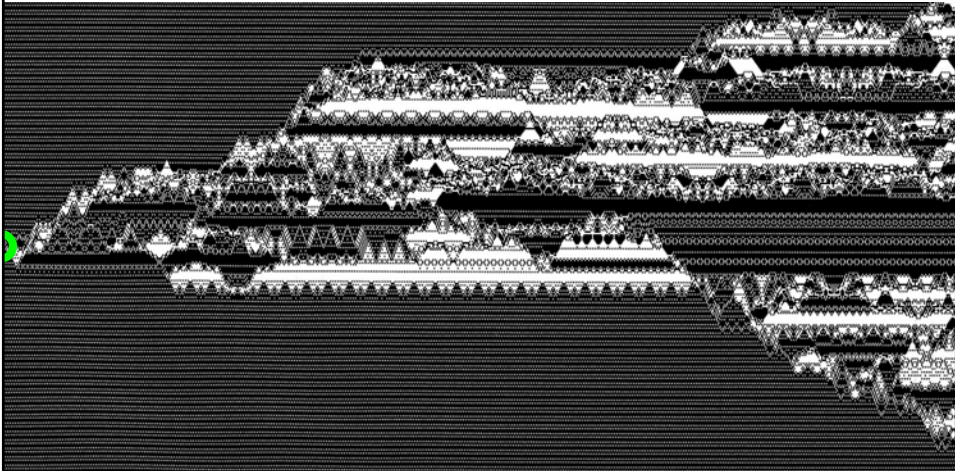
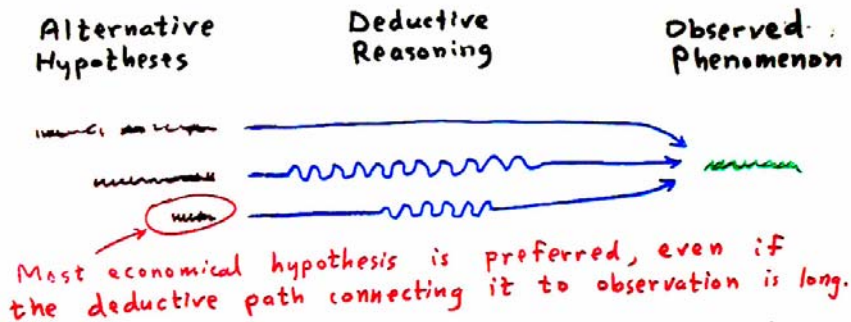

Small irregularity (green) in initial pattern produces a complex
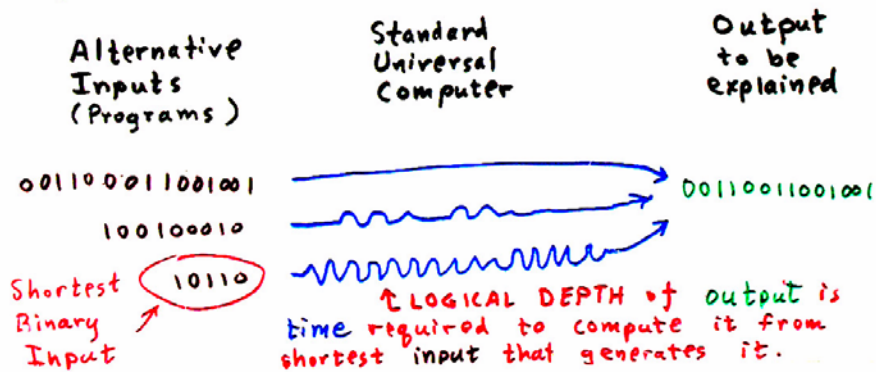deterministic "wake" spreading out behind it.
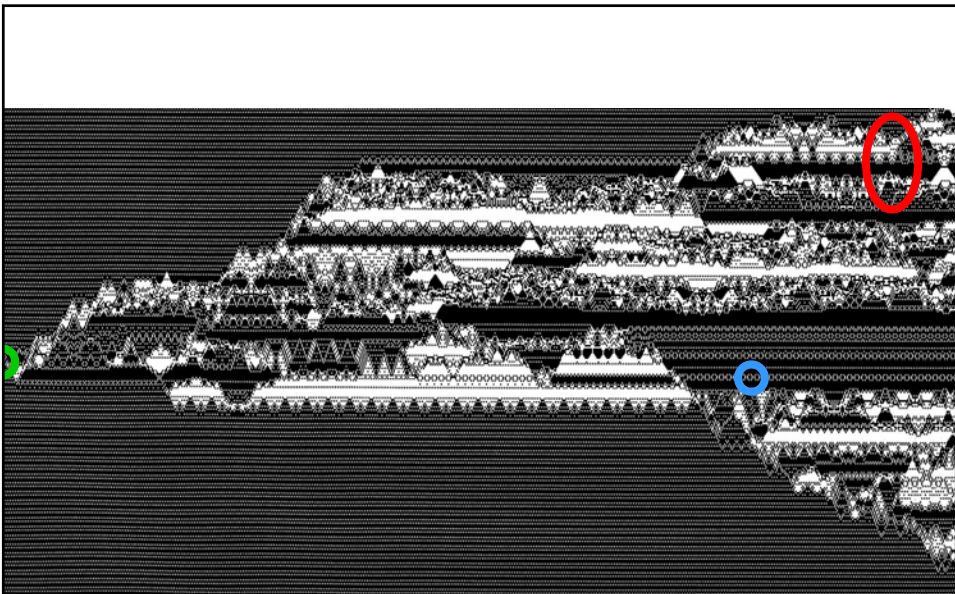
A sufficiently big piece of the wake (red) contains enough evidence
to infer the whole structure. A smaller pieces (blue) does not.

In the philosophy of science, the principle of Occam's Razor directs us to choose the most economical hypothesis able to explain a given body of observed phenomena.

Alternative Hypotheses **Deductive Reasoning** **Observed Phenomenon**

Most economical hypothesis is preferred, even if the deductive path connecting it to observation is long.

This idea is formalized using a universal computer (a device versatile enough in principle to follow any deductive path, or derive the consequences of any physical laws):

Alternative Inputs (Programs) **Standard Universal Computer** **Output to be explained**

00110001100100 1

100100010

Shortest Binary Input   10110

↑ LOGICAL DEPTH of output is time required to compute it from shortest input that generates it.

0011001100100l

In plain words, a logically deep object is one containing internal evidence of having undergone a long and complicated evolution.

Complexity (logical depth) as a measure of good.

Advantage: Nicely attributes value to literature, cultural artifacts, evolved genomes, ecosystems, species, and complex thoughts and emotions (treated in an utterly materialist way, as patterns of atoms in people's brains). Destroying the last copy of a good book, or the last individual of a species or human culture, is especially bad, because it destroys complex information not available elsewhere.

In many cases such losses are prevented by biological and cultural replicative processes. Even a major asteroid impact would probably not destroy all copies of Shakespeare's works, of the human genome, or all Model-T Fords.

Problem: A nuclear weapon is complex, but not good.

Possible answer: Average over the consequences. It can be argued that Hiroshima lost a lot of complexity in a few seconds, e.g. private thoughts, social relationships, and a few artifacts that were destroyed so thoroughly as to be irrecoverable, even in principle, from the rubble and the survivors' memories. This happens of course on a smaller scale when anyone dies, but in the normal course of events, a good deal of the complexity people create is salvaged in the memories of their friends and in the deeds they have done.

The good that people do lives long after them; the evil is oft interred with their bones.

Problem: scaling with number: we would like to believe that many people's happiness is not like many copies of a good book, scarcely more valuable or logically deep than one copy.

Possible answer: People's experiences are so different that they hardly overlap. An adolescent, on falling in love for the first time, tends to think "I am the first person ever to feel this". We elders smile. But for other kinds of experience it probably really is true. For example I find typically that my friends are all different, enriching and complicating my life ways that overlap only slightly from one friend to another.

"Adam was created alone in the world to teach you that whoever destroys a single soul, Scripture imputes it to him as though he had destroyed the entire world; and whoever keeps alive a single soul, Scripture imputes it to him as though he had preserved the entire world."
(Babylonian Talmud)

Question from audience: If each person is unique in their experience and complexity, why not each tree? Then when beavers kill many trees, a lot of evil has been done, even though there may be many surviving trees of the same species in the forest.

Answer: That's a good question. And if trees are unique in their experience, what about bacteria? I guess I would say that somewhere "below" humans but "above" bacteria, the individuality of experience fades away, so killing an individual is no longer like destroying a whole universe.

Question after talk: What about minerals? Some people believe even rocks have souls. They are certainly more individual in their shapes than bacteria.   Can you be sure that converting rocks into mineralarian food and then eating it is cruelty free?

Answer: Maybe rocks are so tough that being eaten by a mineralarian is not painful to them. It certainly seems less violent than the processes of erosion, subduction and volcanism that they experience in nature.

Rebuttal: But if you believe that, then you would say that it is OK to eat domesticated animals if their life on the farm can be made less painful than that of wild animals. Some vegetarians would agree but many would not.

Answer: Unlike animals and plants, rocks do not avoid violent situations. If they have feelings at all, who is to say that they don't actually enjoy participating in the violent events that are their destiny.