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**On the Problem of the Island of Earth:
Introducing a Universal Theory of Value
in an Open Letter to The President of
the United States**

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4 July 2008

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On the Problem of the Island of Earth:

Introducing a Universal Theory of Value¹ in an Open Letter to

The President of the United States

There are situations in economics or international politics in which, effectively, a group of interests are involved in a non-cooperative game without being aware of it; the non-awareness helping to make the situation truly non-cooperative.

(John Nash, NON-COOPERATIVE GAMES, 1950)

For Stephen Hawking² & Richard Dawkins³

4 July 2008

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- 1 (a) As a man's judgement about value, so, in the last resort, must his judgement about economics. Value is the essence of things in economics. Its laws are to political economy what the law of gravity is to mechanics. Every great system of political economy up till now has formulated its own peculiar view on value as the ultimate foundation in theory of its applications to practical life, and no new effort at reform can have laid an adequate foundation for these applications if it cannot support them on a new and more perfect theory of value (Wieser 1893, p xxx).
(b) In economics the most fundamental of these central problems is the theory of value. The theory of value must explain how the comparative values of different goods and services are established. Until that problem is solved, it is not possible to analyse for scientific purposes what will be produced and in what quantities, how the resources will be employed in producing the menu of outputs, and how the resources will be valued. Without a theory of value the economist can have no theory of international trade nor possibly a theory of money. This central problem of value does not change in its essential content if one seeks to explain values in rural or urban societies, or in agricultural or industrial societies. Indeed, if the problem of value were so chameleon like as to alter its nature whenever the economic or political system altered, each epoch in economic life would require its own theory, and short epochs would get short-lived theories (Stigler 1982, p 61).
 - 2 If we are the only intelligent beings in the galaxy we should make sure we survive and continue. But we are entering an increasingly dangerous period of our history. Our population and our use of the finite resources of planet earth are growing exponentially along with our technical ability to change the environment for good or ill.... It will be difficult enough to avoid disaster in the next hundred years, let alone the next thousand or million. Our only chance of long-term survival is not to remain inward looking on planet Earth but to spread out into space.... If we want to continue beyond the next hundred years, our future is in space (Hawking 2008).
 - 3 I want to persuade the reader, not just that the Darwinian world-view happens to be true, but that it is the only known theory that could, in principle, solve the mystery of our existence....

For reasons that are not entirely clear to me, Darwinism seems more in need of advocacy than similarly established truths in other branches of science. Many of us have no grasp of quantum theory, or Einstein's theories of special and general relativity, but this does not in itself lead us to *oppose* these theories! Darwinism, unlike 'Einsteinism', seems to be regarded as fair game for critics with any degree of ignorance. I suppose one trouble with Darwinism, is that, as Jacques Monod perceptively remarked, everybody *thinks* he understands it. It is, indeed, a remarkably simple theory; childishly so, one would have thought, in comparison with almost all of physics and mathematics. In essence, it amounts to simply the idea that non-random reproduction, where there are hereditary variation, has consequences that are far-reaching if there is time for them to be cumulative. But we have good grounds for believing that this simplicity is deceptive. Never forget that, simple as the theory may seem, nobody thought of it until Darwin and Wallace in the mid nineteenth century, nearly 200 years after Newton's *Principia*, and more than 2,000 years after Eratosthenes measured the Earth. How could such a simple idea go so long undiscovered by thinkers of the calibre of Newton, Galileo, Descartes, Leibnitz, Hume and Aristotle? Why did it have to wait for two Victorian naturalists? What was *wrong* with philosophers and mathematicians that they overlooked it? And how can such a powerful idea go still largely unabsorbed into popular consciousness?

It is almost as if the human brain were specifically designed to misunderstand Darwinism, and to find it hard to believe. [all italics Dawkins', 1986, p xiv-xv].

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TOUCHSTONE¹

Nothing is easier than to admit in words the truth of the universal *Struggle for Life*,² or more difficult—at least I have found it so—than constantly to bear this conclusion in mind. Yet unless it be thoroughly engrained in the mind, I am convinced that the whole economy of nature, with every fact on distribution, rarity, abundance, extinction, and variation, will be dimly seen or quite misunderstood. We behold the face of nature bright with gladness, we often see superabundance of food; we do not see, or we forget, that the birds which are idly singing round us mostly live on insects or seeds, and are thus constantly destroying life; or we forget how largely these songsters, or their eggs, or their nestlings, are destroyed by birds and beasts of prey; we do not always bear in mind, that though food may be now superabundant, it is not so at all seasons of each recurring year.

—Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, 1859

1 Every man carries about him a touchstone... to distinguish... truth from appearances [Locke 1706, as cited in Popper 1963, p 3].

2 (a) Our objective here is not to come up with a ponderous definition of war, but rather to capture its essence: *Zweikampf*, *The Struggle for Life*. War is actually nothing but a series of struggles. It may be most helpful to think of the countless struggles that make up war as a single unit, to imagine two wrestlers locked in a hold, each *struggling* to impose his will, to attack, to defend against counter-attack, to render his opponent incapable of further resistance, and, both generally and ultimately, to survive the *Struggle for Life* [General Carl von Clausewitz, *Vom Kriege*, 1832. The author would like to thank Simone Stahel-Webster for her assistance with this English translation; naturally, any errors or omissions may be attributed singularly to the author.].

(b) When we reflect on this struggle, we may console ourselves with the full belief that death is generally prompt, and that the vigorous, the healthy, and the happy survive and multiply [Darwin 1859, p 37, as cited in Gould 2002, p 137].

PORTRAIT OF THOMAS JEFFERSON¹



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- 1 (a) 1788 portrait by John Trumbull (Depicts Jefferson at age 33). Oil on wood. Image: The Thomas Jefferson Foundation.
- (b) We..., the Representatives of the united States of America, in General Congress, Assembled, appealing to the Supreme Judge of the world for the rectitude of our intentions, do, in the Name, and by Authority of the good People of these Colonies, solemnly publish and declare, That these United Colonies are, and of Right ought to be Free and Independent States...; and that as Free and Independent States, ...have full Power to levy War, conclude Peace, contract Alliances, establish Commerce, and to do all other Acts and Things which Independent States may of right do. And for the support of this Declaration, with a firm reliance on the protection of divine Providence, we mutually pledge to each other our Lives, our Fortunes and our sacred Honor (Jefferson 1776).
- (c) HAPPINESS IS generally considered an ultimate goal of life; virtually everybody wants to be happy. The United States Declaration of Independence of 1776 takes it as a self-evident truth that the "pursuit of happiness" is an "unalienable right, comparable to life and liberty. It follows that economics is - or should be - about individual happiness; in particular, how do economic growth, unemployment and inflation, and institutional factors such as governance affect individual well-being? (Frey & Stutzer 2002 p 402).

The Honorable George W. Bush
President of The United States of America
The White House

4 July 2008

Dear Mr President:

On 2 August 1939, Albert Einstein wrote the first of four letters¹ to President Roosevelt because he realized that the rational solution to a global dilemma was not the optimal solution² – yet he realized it was clearly the best solution to a difficult problem which threatened our nation and the future prospect of human life on Earth. I have written this letter because I have discovered a solution to an even more complex and far greater threat to both our nation and the future of the human race.

First, Sir, I will offer an illuminating anecdote and briefly relate how this solution came about. Sir Karl Popper was a young boy, the chaotic and tumultuous aftermath of World War I drew he and many others, of course, into the teachings of Marxist theory, which at the time, were being widely popularized and taught as “scientific socialism.” But Popper grew suspicious, and began to wonder if “socialism” could in fact even be considered “scientific.” As Popper recollected:

I had accepted a dangerous creed uncritically, dogmatically. The reaction made me... a sceptic....

By the time I was seventeen I had become an anti-Marxist. I realized the dogmatic character of the creed, and its incredible intellectual arrogance. It was a terrible thing to arrogate to oneself a kind of knowledge which made it a duty to risk the lives of other people for an uncritically accepted dogma, or for a dream which might turn out not to be realizable. It was particularly bad for an intellectual, for one who could read and think. It was awfully depressing to have fallen into such a trap.

Once I had looked at it critically, the gaps and loopholes and inconsistencies in the Marxist theory became obvious....

1 See Einstein 1939.

2 Life's toughest choices are not between GOOD AND BAD, but between BAD AND WORSE. We call these *choices between lesser evils*. We know that whatever we choose, something important will be sacrificed. Whatever we do, someone will get hurt. Worst of all we HAVE to choose. We cannot wait for better information or advice or some new set of circumstances. We have to decide NOW, and we can be sure that there will be a price to pay. If we do not pay it ourselves, someone else will.

These are the kinds of choices we face when dealing with terrorist threats. If we do too little, we will get attacked again. If we do too much, we will harm innocent people. In making these choices, we never have enough information. Some sources exaggerate the threat; others minimize it. Nothing we are told is reliable and nothing we do is ever likely to strike the right balance (Ignatieff 2004, Preface).

It took me some years of study before I felt with any confidence that I had grasped the heart of the Marxian argument.... Even then I had no intention of publishing my criticism of Marx, for anti-Marxism in Austria was a worse thing than Marxism... Of course I talked about it to my friends. But it was not till sixteen years later, in 1935, that I began to write about Marxism with the intention of publishing what I wrote. As a consequence, two books emerged between 1935 and 1943 – *The Poverty of Historicism* and *The Open Society and Its Enemies*....

Later, in my *Logik der Forschung*, I dealt with this problem very fully (p 43).

Logik der Forschung (The Logic of Scientific Discovery), Popper's magnum opus, gave us at long last a method for discerning between scientific and pseudo-science: During his 1974 *Sveriges Riksbank Prize Lecture, The Pretense of Knowledge*, F.A. von Hayek suggested that

If we are to safeguard the reputation of science, and to prevent the arrogation of knowledge based on a superficial similarity of procedure with that of the physical sciences, much effort will have to be directed toward debunking such arrogations, some of which have by now become the vested interests of established university departments. We cannot be grateful enough to such modern philosophers of science as Sir Karl Popper for giving us a test by which we can distinguish between what we may accept as scientific and what not - a test which I am sure some doctrines now widely accepted as scientific would not pass.

Although I, too, had accepted a dangerous creed uncritically and dogmatically, my path of discovery followed many curious parallels to Popper's search for a better world (and certainly leveraged his methodological insights), one significant difference between the two paths is that Popper ended up discovering his intuition was correct, but I, on the other hand, discovered that my intuition was incorrect. And my great fear, Sir, is based in part of the effective popularization (by figures such as former vice-president Al Gore, Richard Branson, and media figures ranging from Leonardo de Caprio to Oprah Winfrey) and uncritical acceptance of an equally dangerous creed regarding *The Problem of Global Warming*.

By the late 1990's, I had been surfing the California coast – from the Ventura County line to San Diego – for more than a decade, and to state that I was alarmed by the rapidly deteriorating coastal ecosystem would be a significant understatement. I was primarily concerned with *The Problem of Global Warming* (the Kyoto Protocol Dilemma in particular) and, furthermore, it seemed that, in general, our politico-economic development strategy were sub-optimal at best. So I set sail in search of the theoretical politico-economic mechanisms which generated this misguided resource allocation: I began the study of economics because I could not understand *why* neoclassical economics had not long-since been rejected, why it was taking so long for “ecological economics” to make ground in University economics

departments; however, after struggling for some years with the philosophical foundations of economics, I discovered that Robert Aumann was quite right when he suggested that “economics teaches us that things are not always as they appear.”¹

In his 2001 *Sveriges Riksbank Prize* autobiography, Joseph Stiglitz offered:

Growing up in Gary Indiana gave me, I think, a distinct advantage over many of my classmates who had grown up in affluent suburbs. They could read articles that argued that in competitive equilibrium, there could not be discrimination, so long as there are some non-discriminatory individuals or firms, since it would pay any such firm to hire the lower wage discriminated-against individuals, and take them seriously. I *knew* that discrimination existed, even though there were many individuals who were not prejudiced. To me, the *theorem* simply proved that one or more of the assumptions that went into the theory was wrong; my task, as a theorist, was to figure out which assumptions were the critical ones;²

and,

although I grew up in a small farm-town in the vast sea of the great American cornbelt, 41 miles due south of Gary on U.S. Highway 41, my Indiana was not nearly as instructional as Stiglitz's Indiana. But I have come to believe that islands, especially small islands with big problems (and small islands which model equally substantial solutions), may offer even more distinct advantages and more profound economic insights than those offered in Gary, Indiana.³ I have also come to the conclusion that there are very distinct advantages of exploring islands – including their problems and solutions – as an “outsider...”⁴

Islands are lighthouses⁵—beacons far brighter, far more representative, and far more descriptive than mathematical models.⁶

Furthermore, these small islands offer insights which stand in stark contradistinction and diametrical opposition

1 Ibid, p 351.

2 Italics Stiglitz's 2001.

3 Funk 2008a

4 *It is often outsiders who see a problem first.* This may be because an inventor is rightly keen to have his invention applied, and may therefore overlook its possibly undesirable consequences. Thus, certain chemical inventions proved very successful against mosquitoes and other insects, but with the undesirable result that songbirds died of starvation. The American naturalist Rachel Carson reported all this in her excellent book *Silent Spring* (Popper 1999, p 101).

5 Islands are synecdoches: their understanding facilitates a ‘coming to grips’ with a more complex whole. They also act as advance indicators or extreme reproductions of what is future elsewhere. Crucial, new insights into evolutionary theory, and the realization of so much species differentiation on islands in modern zoogeography, are primarily due to the unwitting and haphazard stumbling of what, at first sight, may have appeared to be inconsequential, island-based, island-specific fieldwork. This includes such investigations as the study of Darwin’s finches on the Galapagos Islands (Darwin 1859...) or Alfred Wallace’s study of birds-of-paradise on the Aru Islands (Wallace, 1880)... The forays of Bronislaw Malinowski amongst the Trobriand... Islanders of Papua New Guinea (1922), Margaret Mead to Samoa... (1928; 1934) and Raymond Firth to Tikopia (1936) (Baldacchino 2007b, p 9).

6 (a) Mathematicians may flatter themselves that they possess new ideas which mere human language is as yet unable to express. Let them make the effort to express these ideas in appropriate words without the aid of symbols, and if they succeed, they will not only lay us laymen under a lasting obligation, but, we venture to say, they will find themselves very much enlightened during the process, and will even be doubtful whether the ideas as expressed in symbols had ever quite found their way out of the equations into their minds (Maxwell 1873, p 400).

(b) Civilization advances by extending the number of important operations which we can perform without thinking about them. This is of profound significance in the social field. We make constant use of formulas, symbols, and rules whose meaning we do not understand and through the use of which we avail ourselves of the assistance of knowledge which individually we do not possess. We have developed these practices and institutions by building upon habits and institutions which have proved successful in their own sphere and which have in turn become the foundation of the civilization we have built up (Hayek 1945, pp 519-530).

to most of those discovered by Professor Stiglitz. In short, over the past decade I have struggled to develop a useful method for the analysis of complex systems (the complex system of life on earth in particular), analysis often referred to as *nonlinear dynamics*; and although some advances may be emerging in chaos theory, *The Problem of Induction* limits all mathematical methods to formulating solutions to the most pressing problem threatening the nonlinear dynamics of life on Earth. But I have discovered that islands offer models for complex systems analysis of life on earth far more accurate, reliable, and descriptive than mathematical models,¹ and thus my use of mathematics is more often than not from the *opposite direction*.²

And after spending the past decade struggling with *The Problem of Sustainable Economic Development*, not only did I discover my intuition was incorrect, I managed to derive a solution to this rather complex problem in the process. In order to highlight the neutrality of my approach, I should also disclose, Sir, that, on one hand, I am ashamed that, at 39 years old, I have not once exercised my right as a U.S. citizen to vote; however, on the other hand, I will also note that I am steeped in a tradition³ which does not take such decisions lightly, and, moreover, I now realize that by electing not to vote was the most rational (though admittedly less than optimal) decision, since, in hindsight, it seems I would have mistakenly voted against my personal interests, national interests, and even, as I see so clearly now, global interests (of which more to follow).

Last month I delivered the first of three papers at the Åland International Institute of Comparative Island Studies

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- 1 (a) Civilization advances by extending the number of important operations which we can perform without thinking about them. This is of profound significance in the social field. We make constant use of formulas, symbols, and rules whose meaning we do not understand and through the use of which we avail ourselves of the assistance of knowledge which individually we do not possess. We have developed these practices and institutions by building upon habits and institutions which have proved successful in their own sphere and which have in turn become the foundation of the civilization we have built up (Hayek 1945, pp 519-530).
 - 2 Mathematics is a study which, when we start from its most familiar portions, may be pursued in either of two opposite directions. The more familiar direction is constructive, towards gradually increasing complexity : from integers to fractions, real numbers, complex numbers ; from addition and multiplication to differentiation and integration, and on to higher mathematics. The other direction, which is less familiar, proceeds, by analysing, to greater and greater abstractness and logical simplicity ; instead of asking what can be defined and deduced from what is assumed to begin with, we ask instead what more general ideas and principles can be found, in terms of which what was our starting-point can be defined or deduced (Russell 1919, pp1-2).
 - 3 A story is told of Pyrrho, the founder of Pyrrhonism (which was the old name for scepticism). He maintained that we never know enough to be sure that one course of action is wiser than another. In his youth, when he was taking his constitutional one afternoon, he saw his teacher in philosophy (from whom he had imbibed his principles) with his head stuck in a ditch, unable to get out. After contemplating his for some time, he walked on, maintaining that there was no sufficient ground for thinking he would do any good by pulling the old man out. Others, less sceptical, effected a rescue, and blamed Pyrrho for his heartlessness. But his teacher, true to his principles, praised him for consistency (Russell 1928, pp 1-2).

(AICIS),¹ and although *On the Problem of Sustainable Economic Development: The Funk-Zweikampf Solution to this Prisoner's Dilemma*² offers detailed methodological and contextual descriptions, it is chock-full of data cascades, passionate tricks of the advocate's trade,³ and most desiderata would not warrant your attention, but the abstract offers a concentrated point of departure which will frame our solution, introduce key terms, begin to highlight implications, risks, and opportunities within my objective of offering you a working knowledge of my solution in less than a dozen pages:

This paper offers a solution to *The Problem of Sustainable Economic Development* and a universal theory of value. We introduce axioms, and note they falsify the central thesis of *ecological economics* and solve a problem which has defied theorists since the time of Aristotle.⁴ We introduce our methods, the genesis and evolution of our theory, field notes from Mustique, Iceland, and Prince Edward Island, and set the stage for a more thorough discourse, of which this paper represents the first of three segments. We demonstrate that *value* (V) is a derivative function of *relative insularity* (I_R): $V=f'(I_R)$, then model economic development by dividing the world into geo-political islands⁵: P₁: *Relatively Insular States* (RIS),⁶ and P₂: *Global Economic Military Superpowers* (GEMS).⁷ Our axioms offer two dominant development strategies: S₁: *Maximum Economic Development*, and S₂: *Maximum Ecological Preservation*. Furthermore, we discover pure GEMS (i.e. low I_R) and pure RIS (i.e. high I_R) rational economic development strategies are antithetical, yet also discover these naturally opposing strategies represent the most tenable, rational solution-set possible: in light of inescapable human and planetary uncertainties, we discover the optimal RIS strategy = S₂ and GEMS = S₁. We note our solution represents the Prisoner's Dilemma. We also note, that, *ceteris paribus*, based upon revealed 20th and 21st century preferences, RIS strategy has been sub-optimal/irrational (S₁). GEMS strategy (S₁), however, has been and remains rational and optimal. Strategic Equilibrium/ESS⁸ is attained when players pursue respective rational, opposing development strategies. Equilibrium, however, offers windfalls: surplus value is created (RIS-driven *ecological* protection, and GEMS-driven *planetary* protection). In essence, this non-cooperative, strategic equilibrium paves the way for rational, mutually beneficial, cooperative behaviour, and yields higher ecological and planetary insularities, and thus

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- 1 AICIS... is an Åland based, international and *independent*, research institute which explores the economic and institutional aspects of insular entities - mainly from a comparative point of view. It operates, on a network basis, in close cooperation with other island institutes and academic institutions, as well as with a variety of economic and policy milieus, all over the world. AICIS... is an independent foundation, set up by a number of leading Ålandic companies: Åland Mutual, Alandia Corporations, Bank of Åland, and Åland Investment Ltd. [italics mine AICIS 2008].
 - 2 See Funk 2008a. This complete discourse is published on the AICIS website: Naturally, I would gladly send an updated draft of this paper (v 2.0, 1 July 2008) upon request.
 - 3 Explaining is a difficult art. You can explain something so that your reader understands the words; and you can explain something so that the reader feels in in the marrow of his bones. To do the latter, it sometimes it isn't enough to lay the evidence before the reader in a dispassionate way. You have to become an advocate and use the tricks of the advocate's trade (Dawkins 1985, p xiv).
 - 4 As early as Aristotle we find an attempt to discover a measure of the use value of goods and to represent use value as the foundation of exchange value. In the *Ethica Nicomachea* (v. 5. 1133a, 26–1133b, 10) he says that “*there must be something that can be the measure of all goods* [italics mine, Menger 1871].
 - 5 Our game theoretical approach rests upon a foundation insular evolutionary biology and set theory: our master island set includes all known planets capable of supporting human life. To date this set includes a single element, the island of Earth: $\{I_1\}$. All bio-geo-politico regions on Earth are distinguishable by various degrees of relative insularity, and thus, *all* regions on Earth – islands, continents, and oceans alike – make up the sub-set: $\{i_1, i_2, i_3, \dots, i_n\}$. In other words: $\{i_1, i_2, i_3, \dots, i_n\} \subseteq \{I_1\}$.
 - 6 See ABBREVIATIONS & DEFINITIONS: *Relatively Insular State*
 - 7 See ABBREVIATIONS & DEFINITIONS: *Global Economic Military Superpower*
 - 8 See ABBREVIATIONS & DEFINITIONS: *Strategic Equilibrium*, & *Evolutionary Stable Strategy*

surplus economic and biologic value: RIS cooperate, form coalitions, and struggle for greater *ecological insularity* (ecological preservation); GEMS fight for economic development and *planetary insularity* (global defence, extraterrestrial exploration, and extra-planetary threat mitigation, such as the development of a SHIELD,¹ Gravity Tractor, or Asteroid Tugboat,² and, ultimately, the means to inhabit another planet). Surplus value is maximized through strategic transparency: *If all players recognize the value of respective, opposing, and antithetical, rational strategies, then all players negotiate more rationally, efficiently, and peacefully.* We refer to our solution based upon two opposing, rational strategies as *The Funk-Zweikampf Solution*. Moreover, we demonstrate our solution is as powerful at local and individual levels as it is at the national level, including its use as a tool for strategic decision-making under uncertainty and variable insularity. Furthermore, our *Theory of Value* illuminates an entrenched, systemic, strategic RIS error which reflects the misguided application of economic principles and a fundamental constitutional flaw³ which promotes *The Tragedy of the Commons*.⁴ We consider the effects of relative insularity, the principles of rational pure RIS development strategy, and cite Åland, Iceland, and Japan as ideal island models for RIS/GEMS mixed-strategies. Our theory also suggests that it is no coincidence that the island which best models optimal pure RIS economic development strategy (S₂) is the extraordinarily independent, autonomous, privately-controlled island of Mustique. We note this simplified model does not represent the only RIS mechanism for our solution, however, as all RIS and GEMS may optimize with this counter-intuitive solution. Furthermore, our *Theory of Value* promotes self-organization, constitutional amendment, self-sufficiency, independence, and thus places stones along the illusive path to our tenable solution to *The Problem of Sustainable Development*.⁵

Presently, I will only expand upon and demonstrate the relevance of one statement from this abstract. Recall

that I had asserted that

Surplus value is maximized through strategic transparency: *If all players recognize the value of respective, opposing, and antithetical, rational strategies, then all players negotiate more rationally, efficiently, and peacefully.* We refer to our solution based upon two opposing, rational strategies as *The Funk-Zweikampf Solution*.

1 The greatest natural threat to the long-term survivability of mankind is an asteroid or comet impact with the Earth. SHIELD is an architectural concept for a comprehensive Earth defense system designed to discover, catalog, calculate orbits of near-Earth Object, and to deflect potential impactors (Gold 2001, abstract).

2 See ABBREVIATIONS & DEFINITIONS: *Asteroid Tugboat & Gravity Tractor*

3 Is there a greater tragedy imaginable than that, in our endeavour consciously to shape our future in accordance with high ideals, we should in fact unwittingly produce the very opposite of what we have been striving? (Hayek 1944, p4).

4 (a) It should be clear by now that the idea of the commons did not suddenly arise out of nothing in the year 1968. Passing references to the problem occur as far back as Aristotle, and Lloyd certainly saw it clearly in 1833. H. Scott Gordon's work in 1954 saw the beginning of a new concern with the problems presented by this politico-economic system. Yet the fact remains that a widespread recognition of these problems did not develop until after 1968. Why the delay? Two reasons are apparent. First, a favorable climate of opinion was needed for remarks about the commons to be noticed. This was created in the 1960's by the rapid growth of the environmental movement, which alerted people to the consequences of distributional systems. Second, it was necessary that the properties of the commons be stated in no uncertain terms if people were to consider the matter seriously. It was necessary that the human tragedy of adhering to a commons-type distribution be emphasized. A good, solid fortissimo minor chord had to be sounded. Before 1968 most of the sounds were either mere grace notes or extended passages played pianissimo. The down-playing was for good reason, of course: the clear message of the commons threatened cherished beliefs and practices. Abandoning any traditional practice requires a political upset (though revolution may be too strong a word) (Hardin 1977, p 1).

(b) I will also note that there was another important, insightful, pre-1968 work which clearly details this problem on the public lands of great American West: Stewart 1925. Also see ABBREVIATIONS & DEFINITIONS: *Tragedy of the Commons*

5 Funk 2008a

Please allow me to offer an example. On Monday, April 16, 2007, at 3:56 post-meridian, Reuters reported:

WASHINGTON (Reuters) - The Environmental Protection Agency said on Monday U.S. greenhouse gas emissions linked to global warming increased 16 percent over a 15-year period.

President George W. Bush pulled the United States out of the subsequent Kyoto global warming treaty, arguing the accord's limit on annual emissions would hurt the U.S. economy.

Despite former vice-president Al Gore's insistence that this statement is not true, I understand as well as you do that it is. However, the passage I have highlighted above illustrates a powerful political tool offered by Funk-Zweikampf solution: If an economic theory of value based upon relative insularity were well-understood, relatively insular states, including those low-lying island nations feeling most threatened by the effects of global warming, might be more inclined to understand if we were to say: "We realize that the consequences of global warming are significant, but we must understand that they merely represents *one* of more than a dozen *even more threatening* global risks, and our ability to offer *all* inhabitants of the earth protection from this myriad of global risks depends largely upon an unhindered U.S. economy. And if members of these relatively insular states wish to pursue dominant, rational, selfish economic development strategies, we will likewise understand their reluctance to engage with in the trade when they state "We realize that your economy functions more effectively when all nations, including ours, engage in unrestricted, free-trade with the United States. This, however, does not represent a good, long-term value proposition for us, and you will in fact, in the long term, appreciate our objectives of independence, self-sufficiency, and the maximum preservation of our ecology. With this illustrative point and the abstract in mind, let's move directly to our solution: the Seven Axioms¹ map (1) the lower limit of what *must* be known,² (2) the upper limit of what *may* be known, and thus (3), as Nash noted,³

1 These Axioms rest upon (1) the fundamental physical laws of science, and (2) the syllogistic core of natural selection: (i) *Fluid Mechanics* (Archimedes' Principle), (ii) *Force, Mass, and Inertia* (Kepler's Three Laws of Planetary Motion, Newton's Three Laws of Motion, Newton's Law of Universal Gravitation), (iii) *Heat, Energy, and Temperature* (Newton's Law of Cooling, Boyle's Law, Law of Conservation of Energy, Joule's First and Second Law, The Four Laws of Thermodynamics), (iv) *Quantum Mechanics* (Heisenberg's Uncertainty Principle), and (v) *Superfecundity, Variation, Heredity, and Natural Selection* (Darwin's Laws of Natural Selection).

2 Before we can try to remold society intelligently, we must understand its functioning; we must realize that, even when we believe that we understand it, we may be mistaken. What we must learn to understand is that human civilization has a life of its own, that all our efforts to improve things must operate within a working whole which we cannot entirely control, and the operation of whose forces we can hope merely to facilitate and assist so far as we can understand them (Hayek 1960, pp 69-70).

3 One states as axioms several properties that it would seem natural for the solution to have and then one discovers that the axioms actually determine the solution uniquely. The two approaches to the problem, via the negotiation model or via the axioms, are complementary; each helps to justify and clarify the other (Nash 1953, p 129).

helps determine and clarify our unique solution:

AXIOM I The Ground Zero Premise¹

The Problem of the Struggle for Life

(i) Survival and reproduction is the basic, continuing, inescapable problem for all living organisms; life is at bottom a survival enterprise. It follows that survival is the... “problem” for human societies as well; it is a prerequisite for any other, more exalted objectives. Although the term “adaptation” is also familiar to social scientists, until recently it has been used only selectively, and often very imprecisely... Our economic and social life (and the motivations behind our revealed preferences and subjective utility assessments), not to mention the actions of modern governments... [is] either directly or indirectly related to the meeting of our basic survival needs.²

AXIOM II The R-3 Premise³

The Problem of the Limited Resources

Global natural Resource consumption is approximately three times (3x) the earthly replenishing rate. Though this problem may be soluble on local, municipal, regional, and even on national levels, in light of *The Tragedy of the Commons*, it is insoluble at the global level.

AXIOM III The Ecological Uncertainty Premise

Axiom II poses a threat to Axiom I.

AXIOM IV The Political Uncertainty Premise

The Problem of Warfighting:⁴

(i) (1) the system is anarchic, (2) all great powers have some offensive military capability, (3) **states can never be certain about other states' intentions**, (4) states seek to survive, and (5) great powers are rational actors or strategic calculators.⁵

(ii) Extinction follows chiefly from the competition of tribe with tribe, and race with race. Various checks are always in action, ...which serve to keep down the numbers of each... tribe, such as... famines,... wars, accidents, sickness,... infanticide, and, perhaps, lessened fertility from less nutritious food, and many hardships. If from any cause any one of these checks is lessened, even in a slight degree, the tribe thus favoured will tend to increase; and when one of two adjoining tribes becomes more numerous and powerful than the other, the contest is soon settled by war.⁶

A nuclear exchange involving full superpower arsenals, including resultant nuclear winter..., could result in 2 bn person deaths (30% of world population). Pro rata, this is equivalent to an all-biota loss of 547 bn tonnes biomass. The cumulative risk during 40 years of Cold War of this occurring was seen by some as much as 50 per cent. In the next century, a realignment leading to a new standoff as dangerous as the Cold War cannot be ruled out.⁷

1 Also see annotation 1 under Popper 1992; also see TOUCHSTONE; also see Dawkins 1985,

2 Corning 2000, abstract.

3 Resource Replenishing Rate.

4 In one of the greatest speeches of all time – his second inaugural – Abraham Lincoln said: “Both parties deprecated war; but one would make war rather than let the nation survive; and the other would accept war rather than let it perish. And the war came.” It is a big mistake to say that war is irrational. We take all the ills of the world – wars, strikes, racial discrimination – and dismiss them by calling them irrational. They are not necessarily irrational. Though it hurts, they may be rational. *If war is rational, once we understand that it is, we can at least somehow address the problem. If we simply dismiss it as irrational, we can't address the problem* (Italics mine, Aumann 2005, p 351).

5 Bold and underlined emphasis mine, Mearsheimer, p 112, 2006c.

6 Darwin 1888, p 912.

7 Leggett 2006.

AXIOM V The Planetary Uncertainty Premise

The Problem of Semi-closed Planetary Systems (such as the Earth)

(i) The range of potential types of global risk, as well as their apparent imminence, is significantly increasing. Illustrating this increase, Rees [1] concluded starkly that, if we do nothing, humanity has a 50 per cent chance of becoming extinct within the next century.

(ii) In light of Axiom I, even *if* we are able to mitigate Axiom IV, and even if we are able so survive the next century, given the gravity of the critical problems outlined in this Axiom, an alternative inhabitable planet must be discovered, and immigration must occur within an unknown and unknowable time-frame, ostensibly as soon as tomorrow, but no later 50,000 years from present.¹ Although I will not delve into details for many risk factors below, Mark Leggett's *An Indicative Costed Plan for the Mitigation of Global Risks* details and ranks his assessment of the 15 risk factors most likely to bring about human extinction; although some details are offered to illustrate the relative magnitude, for brevity's sake (and a minor difference of opinion on a few minor points), not all are detailed nor even listed (though I have added a few), but please read with the assumption that any and all known significant risks are theoretically included: this axiom's purpose is not to provide an exhaustive list of risk factors, but to illustrate the nature of the dilemma *The Problem of Sustainable Economic Development* inherently presents. However, it is of interest and relevant to this letter to note that Leggett ranks *The Problem of Global Warming* 8th out of 15. Risks are roughly listed in order of importance:

(1) *The Problem of Scientific Experiments Altering the Fabric of the Universe and/or the Ecology of Earth*²

(2) *The Problem of Meteorites:*

(a) The Earth has a long and violent history of collisions with extraterrestrial bodies such as asteroids and comet nuclei. Several of these impacts have been large enough to produce major environmental changes, causing mass extinctions and severe alterations to weather patterns and geography. There is no reason to suppose that the likelihood of such collisions will be any less in the future and the spread of human settlement, civilisation, and particularly urbanisation, makes it much more likely that a future impact, even relatively small, could result in the massive loss of human life and property. Despite the fact that the technology exists to predict and to some extent prevent such events, there is currently no co-

1 Stephen Hawking called for a massive investment in establishing colonies on the Moon and Mars in a lecture in honour of NASA's 50th anniversary. He argued that the world should devote about 10 times as much as NASA's current budget – or 0.25% of the world's financial resources – to space.

The renowned University of Cambridge physicist has previously spoken in favour of colonising space as an insurance policy against the possibility of humanity being wiped out by catastrophes... He argues that humanity should eventually expand to other solar systems....

"Robotic missions are much cheaper and may provide more scientific information, but they don't catch the public imagination in the same way, and they don't spread the human race into space, which I'm arguing should be our long-term strategy," Hawking said. "If the human race is to continue for another million years, we will have to boldly go where no one has gone before."

"We cannot envision visiting them with current technology, but we should make interstellar travel a long-term aim," he said. "By long term, I mean over the next 200 to 500 years...."

"Even if we were to increase the international [space exploration] budget 20 times to make a serious effort to go into space, it would only be a small fraction of world GDP," he said. GDP, or Gross Domestic Product, is a measure of a country's economic activity.

Hawking argued that the world can afford 0.25% of its collective GDP to devote to space colonisation. "Isn't our future worth a quarter of a percent?" he asked.

The physicist also speculated on the reasons that SETI (Search for Extra-Terrestrial Intelligence) projects have not yet detected any alien civilisations.

He offered three possibilities: that life of any kind is very rare in the universe; that simple life forms are common, but intelligent life rare; or that intelligent life tends to quickly destroy itself.

"Personally, I favour the second possibility – that primitive life is relatively common, but that intelligent life is very rare," he said.

"Some would say it has yet to occur on Earth" (Hawkins & Shiga 2008).

2 See Greenleaf & Kremen 2006 ; Leggett 2006.

ordinated international response to this threat.¹

(b) It is widely believed that meteorites originate in the asteroid belt, but the precise dynamical mechanism whereby material is transported to Earth has eluded discovery. The observational data for the ordinary chondrites, the most common meteorites, impose severe constraints on any proposed mechanism. The ordinary chondrites are not strongly shocked, their cosmic ray exposure ages are typically <20 Myr, their radiants are concentrated near the antapex of Earth's motion and they show a pronounced 'afternoon excess' (for every meteorite which falls in the morning two fall in the afternoon). Wetherill concluded that these data could only be explained by an "unobserved source" of material... His subsequent, more sophisticated investigations have not changed this basic conclusion. Recently I have shown that there is a large chaotic zone in the phase space near the 3/1 mean motion commensurability with Jupiter and that the chaotic trajectories within this zone have particularly large variations in orbital eccentricity. Since asteroidal debris is quite easily injected into this chaotic zone, it could provide Wetherill's 'unobserved source' if chaotic trajectories which begin at asteroidal eccentricities ($e < 0.2$) reach such large eccentricities that Earth's orbit is crossed ($e > 0.57$)... At least some of these chaotic trajectories do have the properties required to transport meteoritic material from the asteroid belt to Earth. Combined with the Monte Carlo calculations which show that the resulting meteorites are consistent with all the observational constraints, *the case for this chaotic route to Earth is fairly strong* [italics mine].²

(3) *The Problem of Biovorous Nanoreplicators*

(4) *The Problem of Supermassive Star Collapse*

(5) *The Problem of Super-Eruptions:*

(a) In the past 2 Myr, there have been, on average, two super-eruptions every hundred millennia, the last of which shattered the crust of New Zealand's north island 26,500 years ago. To date, no mechanisms have been discovered for predicting these events; thus an eruption of this magnitude (VE8)³ is possible within this decade and likely within 50,000 years. Post-eruption human survival is unlikely; even smaller eruptions (VE4, VE5, VE6) present extraordinary challenges.

(b) The Laki eruption, and other similar large lava eruptions in Iceland (e.g., Eldgja, AD 934...) and the Canary Islands (Lanzarote, AD 1731...), was accompanied by widespread dry fogs... and unusual climatic cooling in the northern hemisphere... Using the ice core record, it can be seen that large Icelandic fissure basalt eruptions ($\geq 10 \text{ km}^3$) occur perhaps about once per millennium (e.g., AD934 and AD1783)... Estimates of H_2SO_4 aerosols produced by Laki range from 77–190 Mt based on erupted volume of magma, to 100–280 Mt based on acid fallout over Greenland (Stothers 1996). From estimates of atmospheric opacity in the dry fog of 1783 over Europe, Stothers (1996) suggested an aerosol mass of ~150 Mt. The resulting "haze famine" in Iceland, related to crop failures and livestock death from volcanic pollution (from SO_2 , F, Cl, etc.), led to the death of 25% of the Icelandic population. The AD 934 Eldgja eruption may have had a similar serious effect on early Icelandic colonization (Stothers 1998). Historic eruptions were quite small, however, compared to some volcanic events in the geologic record of the past million years that may truly be called "supereruptions." The largest recorded explosive eruptions (VEI =8 and $\geq 10^{12} \text{ m}^3$ of bulk deposits) were large caldera-forming eruptions that produced large-volume pyroclastic flow deposits (ignimbrites) and widespread ashfall... Some of the largest events occurred in continental hotspot areas where extensional tectonics and thick continental crust lead to large-volume magma chambers of silicic composition... The greatest explosive eruption in the past few hundred thousand years was the Toba (Sumatra) event of ~73,500 years ago... This event produced at

1 Tate 2006, abstract.

2 Wisdom 1985, abstract.

3 Self 1982

least 2,800 km³ of magma (pyroclastic flow deposits, pumice fall, and ash) and is estimated to have created from 1,000 to 10,000 Mt of stratospheric dust and sulfuric acid aerosols... Extrapolation of the data of Pyle et al. (1996) to VEI 8 eruptions gives about 1000 Mt of SO² release, which would be converted to aerosols in the stratosphere. The Toba aerosols apparently persisted for up to 6 years in the upper atmosphere... Based on scaling up from smaller eruptions and computer models, stratospheric aerosol loading of ~1000 Mt is predicted to have caused a “volcanic winter,” with a global cooling of 3to5°C for several years, and regional coolings up to 15°C... Such a cooling is estimated to have drastically affected tropical and temperate vegetation and ecosystems... All above-ground tropical vegetation would have been killed by sudden hard freezes, and a 50% die-off of temperate forests is predicted from hard freezes during the growing season... This probable climatic and ecologic disaster may have impacted humans. Evidence from human genetic studies have been interpreted as indicating a severe human population bottleneck—a near extinction—with reductions to a total population as small as a few thousand at a time just prior to ~60,000 years ago... This is roughly the same interval as the great Toba eruption, and a cause and effect relationship with Toba has been proposed... and is supported by the predicted severe ecological effects of the eruption.

(6) *The Problem of Global Warming*

(7) *The Problem of Ice Ages* (both natural and anthropogenic)

(8) *The Problem of Chaotic Behaviour:*

There are several physical situations in the solar system where chaotic behavior plays an important role. Saturn's satellite Hyperion is currently tumbling chaotically. Many of the other irregularly shaped satellites in the solar system had chaotic rotations in the past. There are also examples of chaotic orbital evolution. Meteorites are most probably transported to Earth from the asteroid belt by way of a chaotic zone. Chaotic behavior also seems to be an essential ingredient in the explanation of certain non-uniformities in the distribution of asteroids. The long-term motion of Pluto is suspiciously complicated.¹

(9) *The Problem of Solar Flux:*

There has been life on Earth for at least 3,500 Myr but the assumption that a comparable future lies ahead may not be justified. Main sequence stars appear to increase their burning rate as they age. Thus the Sun, if a typical star, can be predicted to have increased its output by 30% since the Earth's origin 4,500 Myr ago. The maintenance of an equable climate since life began probably required some means of planetary thermo-stasis. The Gaia hypothesis proposed by Lovelock and Margulis included an unspecified biological means for climate control. Walker... suggests an abiological automatic thermostasis in which the atmospheric abundance of CO₂, a greenhouse gas, adjusts to resist the warming tendency of the increased solar flux. It is clear that whatever the mechanism, atmospheric CO₂ is now close to its lower limit of partial pressure, so the biosphere may soon, in geological terms, be exposed without protection to the predicted progressive increase of solar luminosity.²

(10) *The Problem of Ohmic Decay:*

The mechanism by which the Earth and other planets maintain their magnetic fields against ohmic decay is among the longest standing problems in planetary science. Although it is widely acknowledged that these fields are maintained by dynamo action, the mechanism by which the dynamo operates is in large part not understood. Numerical simulations of the dynamo process in the Earth's core have produced magnetic fields that resemble the Earth's field, but it is unclear whether these models accurately represent the extremely low values of viscosity believed to be appropriate to the core.³

1 Wisdom 1987, abstract.

2 All italics mine, Lovelock & Whitfield 1982, abstract.

3 Kuang & Bloxham 1997, abstract.

AXIOM VI The Deductive Premise

*The Problem of Induction*¹

This may represent the most deeply entrenched, least understood (and/or acknowledged),² relatively simple problem on Earth, and thus perhaps the crux of his axiomatic solution. Therefore, we offer a clarification within the following Axiom and within the closing remarks which follow our axiomatic derivation of our solution. For now, however, consider the following proposition: *Will the sun rise tomorrow?* Those whom have mistakenly adopted inductive methods would conclude that, based upon 5,292.5 billion affirmative inferences (365 days X 14.5 Byr), yes, we may conclude with certainty (and validity) that the sun will rise tomorrow. However, as we have just demonstrated in both axioms IV and V, there are many *black swans* which would falsify our inductive logic. As Professor Popper noted, *no matter how many instances of white swans we may have observed, this does not justify the conclusion that all swans are white.*

AXIOM VII The Insularity Premise

The Problem of Value

The search for an economic theory of value may have begun with Aristotle. For the next half-century, however, very little progress was made, and the evolutionary stable strategy tabled in 1776 by Smith³ was fully adopted by the classical school and generally accepted for nearly a century. The German school grew critical, however, and this Germanic scepticism gave birth to the Austrian School and their quest for a new *Theory of Value*, which began with a very independent professor of political economy at the University of Vienna, the Austrian School's founding father, Carl Menger (1840–1921). In his 1871 *Grundsätze der Volkswirtschaftslehre (Principles of Economics)*, Menger outlines his groundbreaking theory.⁴

Perhaps the most convoluted, self-refuting theory may have been tabled by Walras in 1886.⁵ Walras, however, was certainly not alone in his approach. Indeed, all known (to this fairly well-read author, that is) attempted solutions since Menger have, essentially, followed Wieser's method,⁶ and, despite the extraordinary efforts from Aristotle to Smith to Menger to Weiser, economics has remained without a theory of value. Note, however, the development of our theory has *not* followed the methodological approach consistent with previous attempts. Based upon our understanding that insularity is the key to

1 See ABBREVIATIONS & DEFINITIONS: *The Problem of Induction*.

2 It took a remarkably long time before the novelty of the intellectual situation was grasped. Few realized what had happened. David Hume...saw that a great step forward had been taken, but he did not understand just how great and how radical this advance in human knowledge really was. *I am afraid that even today many people still do not fully understand this* [Italics mine, Popper 1994, p 36].

3 (a) Gould 2002.

(b) It has been said that one finds in Adam Smith nearly all the explanations of value which have ever been attempted. What is certain is that, in his explanation, Adam Smith has put together two views that contradict each other (Wieser 1893, p xxvii).

4 (a) It is in Austria, in the lineal succession to Menger, that the development of the new value theory is to be sought (Wieser 1893, p xxxiv).

(b) In Chapter III, Menger (1871) presents his groundbreaking *Theory of Value*; the essence, clarity, and promethean insight of this chapter may best sampled in Section E: *The value of the services of land, capital, and labour, in particular*.

5 That of Walras, though admirable of its kind, suffers, to my mind, from the preponderance of the mathematical element. The laws which govern amounts of the value undoubtedly allow of a mathematical expression ; nay, the more complicated of these can be expressed exactly only by means of mathematics ; and here certainly mathematics has a great task to fulfil. But in the value theory we have to do with something more than the expression of the laws of amounts. The obscure conception of value is to be made clear ; *all its manifold forms are to be described* [italics mine] ; the service of value in economic life is to be analysed ; the connection of value with so many other economic phenomena is to be shown (Wieser 1893, p xxxiii).

6 The economist who undertakes to explain value has to explain the procedure of those who value. He describes in plain language the meaning of transactions carried on, times without number, by all of us. He does, on a large scale and with a difficult subject, the same thing as one who accurately describes some trade or some mechanical operation, which every one can do, but which it is not easy, without the assistance of concrete instances, to present and follow up in all its complexity of conditions (1893, p 5).

evolutionary fitness (including, for example, *economic* evolutionary fitness) and thus life on earth,¹ our theory of value is constructed by demonstrating that *value* (V) is a *derivative function* of relative insularity; we are able to quantify value far more accurately *and* far more easily by quantifying it *indirectly*.² Aside from the originality of value based upon insular qualities, the *derivative nature* of this theory is what lends this insight elegance, simplicity, and power: $V=f'(I_R)$! The utter simplicity and descriptive power of this theory, what sets it apart from every known previous attempt, is this is the first which expressly does *not* attempt to “describe all manifold forms,” and “the myriad connections of economic phenomena;” rather, this theory describes the *environment*³ in which economic value is created (from which it is *derived*)! In other words, the relative insularity of a biogeographic region itself is *not* what makes it valuable, the value is *derived* as a direct by-product of this insularity. For example, backing out to the most macro-view, a quick look at the *relative insularity* of the Earth reveals that the earth is *more valuable, relatively speaking*, than the other planets in our solar system due to the value of the relatively high level of atmospheric insularity which enables the Earth to produce both biologic *and* economic value: *Life!*

Moreover, although our quest had commenced as a search for an *economic* theory of value, in the end, our solution produced a *universal* (economic and biologic) *Theory of Value*, which presents a solution to what arguably represents the most fundamental problem in any so-called “field” of science, since relative insularity is as valuable to whales, dragonflies, and unicellular organisms as it is to man. Although this solution was inadvertent, it is a logical outcome, since it is well understood that a useful, truthful economic theory of value requires a biogeographical and political foundation which acknowledged *The Problem of Induction*, including both political and extraterrestrial uncertainties. Our theory was constructed by simply observing nature, by simply observing the universal revealed preference for relative insularity, and thus, moreover, discovering that *value* (V) is a derivative function of *relative insularity* (I_R): $V=f'(I_R)$. Our axioms also reveal that, contrary to the central thesis of so-called “ecological economics,” the Earth is not in fact a closed-system, but rather merely *semi-closed* and thus only relatively insular. Comprehending these biological and planetary realities is the cornerstone to the comprehension of our unified theory. Greater clarity may be derived with the following game theoretical application: Applying our *Theory of Value* within requisite biogeographical & political context of the necessarily non-cooperative game (in which all the world is a stage; note the great Nash insight pasted across the cover-page) reveals divergent, optimizing rational strategies for *continental* (GEMS) and *insular* (RIS) economic development. Our theory reveals pure GEMS and RIS strategies are antithetical, yet discover, in light of *The Problem of Induction*, these naturally opposing strategies represent the most tenable, rational solution possible. How is it possible that two players may arrive at two *different*, antithetical optimal strategies when utilizing the same theory of value? Although there is ultimately only one sphere of insularity, it must be defended on two *inherently uncertain* levels: (1) insularity pertaining to the biosphere (i.e. Ecology: Axioms I-III, the “whole world” according to the principles of “ecological

1 Carlquist 1974, p 1.

2 I_R is formulated with: *Land Area* (km^2), *Elevation* (m), *Distance from nearest Continent* (km), *Distance from nearest Neighbour* (km), *Nearest Neighbour Land Area* (km^2), *Renewable Water Resources* ($m^3/person/year$), *Population Density* (p/km^2), *Exclusive Economic Zone Area* (km^2), *International Airports* (n), *Deep Water Harbours* (n), *Marine Links*, (n) *Land Links* (n), *Forests* ($\% km^2$), *Commercial Agriculture* ($\% km^2$), *Organic Agriculture* ($\% km^2$), *Subsistence Agriculture* ($\% km^2$), *Nature Preserve* ($\% km^2$), *Tourist Visits* (p/yr), *Irrigation* ($m^3/person/year$ & $\% km^2$), *Industrial Water Consumption* ($m^3/person/year$), *Organic Water Pollutants* ($grammes/p/day$), *Food Imports* ($\%$), *Sovereign Status*, *Constitutional Balance*, *Cultural Homogeneity*, and *Military Power*. We calibrate our formulae by adjusting relative input weighting in accordance a positive, linear biogeographical correlation between I_R and the average human life expectancy for the corresponding politico-biogeographic area.

3 One of the great discoveries of game theory came in the early seventies, when the biologists John Maynard Smith and George Price realized that strategic equilibrium in games and population equilibrium in the living world are defined by the same equations. Evolution be it genetic or memetic – leads to strategic equilibrium (Aumann 2005, p 352).

economics”), and (2) insularity pertaining to the semi-closed nature of the biosphere, including planetary and extra-planetary forces and uncertainties (i.e. meteorites, volcanoes, chaotic gravitational forces, supernovas, etc.: Axiom V), and geopolitical uncertainty (i.e. War: Axiom IV). Generally speaking, pure RIS strategy protects relative insularity on the first level, while GEMS pure strategy protects relative insularity on the second level. Moreover, our theory of value is as applicable and powerful at the local and individual levels as it is at the national/global level, including its use as a powerful analytical tool applicable to common problems, such as: (1) where to live (addressing both biogeographical and geopolitical insularity), (2) what to eat, (3) how to vote, (4) where to vacation, (5) what type of vehicle to drive, (6) what types of investments to make, (7) what water to drink, and, most generally, (8) understanding how relative insularity frames strategic decision-making under uncertainty.

I realize this concentrated outline is perhaps yet rather abstract, but I trust the implications and the utility may be immediately recognizably; if they are not as readily clear as I hope they may be, I detailed some of the most significant implications in a recent, necessarily¹ pointed letter which I believe the first few pages may offer clarification:

Sir Partha Dasgupta, Fellow, St. John's College
University of Cambridge, Faculty of Economics
Sidgwick Avenue
Cambridge, England

1 May 2008

RE: A Solution to *The Problem of Sustainable Economic Development*

Dear Sir:

I am writing to inform you that you have made a great mistake.

Your error came to my attention while reviewing *Nature in Economics*.² I emphasize the greatness of this mistake because, upon a broad review of your considerable works,³ I have discovered that this fundamental error is entrenched in your most fundamental assumptions, and in short, I conjecture you have committed this error for four (possibly five) primary reasons : (1) you do not understand *The Problem of Induction*, (2) you do not understand that economics is a *derivative science* (and *derivative*, in this

¹ What Mises taught us in his writings, in his lectures, in his seminars, and in perhaps everything he said, was that economics—yes, and I mean sound economics, Austrian economics—is primordially, crucially important. Economics is not an intellectual game. Economics is deadly serious. The very future of mankind—of civilization—depends, in Mises’ view, upon widespread understanding of, and respect for, the principles of economics.

This is a lesson, which is located almost entirely outside economics proper. But all Mises’ work depended ultimately upon this tenet. Almost invariably, a scientist is motivated by values not strictly part of the science itself. The lust for fame, for material rewards—even the pure love of truth—these goals may possibly be fulfilled by scientific success, but are themselves not identified by science as worthwhile goals. What drove Mises, what accounted for his passionate dedication, his ability calmly to ignore the sneers of, and the isolation imposed by, academic contemporaries, was his conviction that the survival of mankind depends on the development and dissemination of Austrian economics.

Austrian economics is not simply a matter of intellectual problem solving, like a challenging crossword puzzle, but literally a matter of the life or death of the human race (Kirzner 2006).

² 2007.

³ See SELECTED BIBLIOGRAPHY: Dasgupta.

sense, is not a reference to the well-known financial WMD's,¹ but rather to Bertrand Russell's *Theory of Economic Power*,² and moreover (3) you have failed to comprehend, essentially, *the whole economy of nature*;³ (4) you do not understand that subject matters do not exist,⁴ and (5) another possible reason, I suspect, may be related to your personal religious beliefs, but since I do not know you personally, I will leave this point for your consideration...⁵

1 The derivatives genie is now well out of the bottle, and these instruments will almost certainly multiply in variety and number until some event makes their toxicity clear. Knowledge of how dangerous they are has already permeated the electricity and gas businesses, in which the eruption of major troubles caused the use of derivatives to diminish dramatically. Elsewhere, however, the derivatives business continues to expand unchecked. Central banks and governments have so far found no effective way to control, or even monitor, the risks posed by these contracts.

Charlie and I believe Berkshire should be a fortress of financial strength – for the sake of our owners, creditors, policyholders and employees. We try to be alert to any sort of megacatastrophe risk, and that posture may make us unduly apprehensive about the burgeoning quantities of long-term derivatives contracts and the massive amount of uncollateralized receivables that are growing alongside. In our view, however, derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal [Buffett 2003, p 15. Also see Jon Danielsson's (2000) *The Emperor has no Clothes: Limits to Risk modeling*].

2 (a) *Economic power, unlike military power, is not primary, but derivative.* Within one State, it depends on law; in international dealings it is only on minor issues that it depends on law, but *when large issues are involved it depends upon war or the threat of war.* It has been customary to accept economic power without analysis, and this has led, in modern times, to an undue emphasis upon economics, as opposed to war and propaganda, in the causal interpretation of history.

Apart from the economic power of labour, all other economic power, in its ultimate analysis, consists in being able to decide, by the use of armed force if necessary, who shall be allowed to stand upon a given piece of land and to put things into it and take things from it [all italics mine, 1928, p 95].

(b) *The very nature of economics is rooted in nationalism...It would never have been developed except in the hope of throwing light upon questions of policy, but policy means nothing unless there is authority to carry it out, and authorities are national* [italics mine Robinson 1962, p 117].

(c) Power Projection: The ability of a nation to apply all or some of its elements of national power - political, economic, informational, or military - to rapidly and effectively deploy and sustain forces in and from multiple dispersed locations to respond to crises, to contribute to deterrence, and to enhance regional stability (The United States Department of Defense 2001).

3 See ABBREVIATIONS & DEFINITIONS: *The Struggle for Life*.

4 As a rule, I begin my lectures on Scientific Method by telling my students that scientific method does not exist. I add that I ought to know, having been, for a time at least, the one and only professor of this non-existent subject within the British Commonwealth.

It is in several senses that my subject does not exist, and I shall mention a few of them.

First, my subject does not exist because subject matters in general do not exist. *There are no subject matters; no branches of learning—or, rather, of inquiry: there are only problems, and the urge to solve them.* A science such as botany or chemistry (or say, physical chemistry, or electrochemistry) is, I contend, merely an administrative unit. University administrators have a difficult job anyway, and it is a great convenience to them to work on the assumption that there are some named subjects, with chairs attached to them to be filled by the experts in these subjects. I do not agree: even serious students are misled by the myth of the subject. And I should be reluctant to call anything that misleads a person a convenience to that person.

So much about the non-existence of subjects in general. But Scientific Method holds a somewhat peculiar position in being even less existent than some other non-existent subjects.

What I mean is this. The founders of the subject, Plato, Aristotle, Bacon and Descartes, as well as most of their successors, for example John Stuart Mill, believed that there existed a method of finding scientific truth. In a later and slightly more sceptical period there were methodologists who believed that there existed a method, if not of finding a true theory, then at least of ascertaining whether or not some given hypothesis was true; or (even more sceptical) whether some given hypothesis was at least 'probable' to some ascertainable degree.

I assert that no scientific method exists in any of these three senses. To put it in a more direct way:

(1) There is no method of discovering a scientific theory.

(2) There is no method of ascertaining the truth of a scientific hypothesis, i.e., no method of verification.

(3) There is no method of ascertaining whether a hypothesis is 'probable', or probably true [Popper 1956, pp 5-6].

5 (a) The word God is for me nothing more than the expression and product of human weaknesses, the Bible a collection of honourable, but still primitive legends which are nevertheless pretty childish. No interpretation no matter how subtle can (for me) change this. These subtilised interpretations are highly manifold according to their nature and have almost nothing to do with the original text. For me the Jewish religion like all other religions is an incarnation of the most childish superstitions. And the Jewish people to whom I gladly belong and with whose mentality I have a deep affinity have no different quality for me than all other people. As far as my experience goes, they are also no better than other human groups, although they are protected from the worst cancers by a lack of power. Otherwise I cannot see anything 'chosen' about them.

In general I find it painful that you claim a privileged position and try to defend it by two walls of pride, an external one as a man and an

I have not written this letter to be cruel; it is not my intent to ridicule you. In fact, as I have stated, I do suspect you may be a great man. But, following in the footsteps of Popper, Russell, Pyrrho,¹ and Socrates, I have accepted an obligation to stand my post, remain ever on the lookout, and never hesitate to table criticism. Indeed, our survival may depend upon it.²

Did you notice the brief outline of my “UNIFIED THEORY OF THE BIOLOGICAL AND SOCIAL SCIENCES & SOLUTION TO THE PROBLEM OF SUSTAINABLE ECONOMIC DEVELOPMENT” I clipped to the top of this letter? If you considered the axioms carefully, perhaps your great mistake has already occurred to you. I did endeavour, after all, to make this lesson as simple as possible for you to understand. If it hasn't occurred to you yet, note that your assumptions, the framework upon which all of your works have been based for at least the past two decades, are contained within axioms I through III. Although I am not a gambling man, I believe you will discover your mistakes may be directly related to the fact that you have failed to comprehend inherent uncertainties associated with axioms IV through VII (of which, more to follow). I've noted errors are nothing to be ashamed of; this error is especially free of disgrace, since *all* of your fellow practitioners of your so-called “ecological economics” (as well as many other economists, naturally) have committed, and continue to commit the exact same error. Yes, I believe you will discover that this discourse is not simply a refutation of your *Nature in Economics*, but ultimately a falsification of the theoretical framework and central thesis of “ecological economics”....

Over the past forty years... many of those most able to navigate the perilous seas³ of economics, mistakenly assert that neoclassical economic theory fails to pass the test of the second law of thermodynamics,⁴ then proceed

internal one as a Jew. As a man you claim, so to speak, a dispensation from causality otherwise accepted, as a Jew the privilege of monotheism. But a limited causality is no longer a causality at all, as our wonderful Spinoza recognized with all incision, probably as the first one. And the animistic interpretations of the religions of nature are in principle not annulled by monopolisation. With such walls we can only attain a certain self-deception, but our moral efforts are not furthered by them. On the contrary (Einstein 1954).

(b) I am aware that the assumed instinctive belief in God has been used by many persons as an argument for His existence. But this is a rash argument, as we should thus be compelled to believe in the existence of many cruel and malignant spirits, only a little more powerful than man; for the belief in them is far more general than in a beneficent Deity. The idea of a universal and beneficent Creator does not seem to arise in the mind of man, until he has been elevated by long-continued culture (Darwin 1883, p 1242).

(c) Beware of the man whose god is in the skies (Shaw 1903, ln 83).

^(d) Also see Hitchens 2007 ; Weale 2007 ; Dawkins 2006 ; Darwin 1883 ; Russell 1931 ; Hume 1777a, 1777b, & 1779.

- 1 Sceptic: A seeker of truth. One who, like Pyrrho and his followers in Greek antiquity... holds that there are no adequate grounds for certainty as to the truth of any proposition... Those who deny the competence of reason, or the existence of a justification for certitude, outside the limits of experience. The difference between the two usages becomes clearer when considering ‘sceptic’s’ Latin origin (scepticus): inquiring, reflective, assumed by the disciples of Phyrro as their distinctive epithet... to look out (OED 1997).
- 2 If our civilization is to survive, we must break with the habit of deference to great men. Great men may make great mistakes... Their influence, too rarely challenged, continues to mislead those on whose defense civilization depends, and to divide them. The responsibility for this tragic and possibly fatal division becomes ours if we hesitate to be outspoken in our criticism of what admittedly is a part of our intellectual heritage. By our reluctance to criticize some of it, we may help to destroy all of it (Popper 1945, inscription).
- 3 There are ‘perilous seas’ in the world of thought, which can only be sailed by those who are willing to face their own physical powerlessness. And above all, there is liberation from the tyranny of Fear, which blots out the light of day and keeps men grovelling and cruel. No man is liberated from fear who dare not see his place in the world as it is; no man can achieve the greatness of which he is capable until he has allowed himself to see his own littleness (Russell 1928, pp 22).
- 4 Economic theory has always maintained that economic value is “generated” solely within the economy where it is fully distributed among the factors of production before being “consumed”. According to this theory, the economy is an isolated system that does not need flows to pass across its boundaries in support of its steady state (“general equilibrium”). From a thermodynamic point of view this idea is unacceptable. According to thermodynamic theory, any open system, which allows flows of matter and energy to cross its boundaries, is capable of maintaining itself in steady state only because it “transport” value from its environment to restore the value that has been “consumed” within the system and dissipated. Drawing on the analogy with thermodynamics, this paper replaces the traditional systemic analog of the economy, which is the closed “circular flow” process, with the steady flow process. According to this analog, any efficient economy is an open system both physically and economically requiring a “flow” of economic value to maintain its steady state. In other words, an economically isolated system has to be inefficient and is bound to misallocate and overuse environmental resources. Whether the economy behaves as an economically isolated (inefficient) or open (efficient) system is an empirical question. However, if real economies are economically open and

to report that, based upon this “revolutionary new perspective”, we are now positioned to “reshape economic theory and policy”.¹ The problems which appear to consistently elude you all is [that] you have failed to recognize the mission-critical nature of Axioms IV-VII.

Take, for example, a recent reformulation of ecological economics' central thesis from one of your so-called “field's” founding fathers, Herman E. (*ECONOMICS IN A FULL WORLD*, *Scientific American*, September 2005, Vol. 293, Issue 3):

But the facts are plain and *uncontestable*: the biosphere is finite, nongrowing, *closed* (except for the constant input of solar energy), and constrained by the laws of thermodynamics. Any subsystem, such as the economy, must at some point cease growing and adapt itself to a dynamic equilibrium, something like a steady state.

But are the *facts plain* and *uncontestable*? Is the biosphere *finite* and *closed*? No, two strikes, wrong on both counts. Daly has failed, as you have failed, to grasp that greatest truth of all truths.² Go back and look at those axioms again. Pay attention to Axioms IV and (especially) Axiom V. Think about it: it's *not* a closed system, is it? The facts are not *plain* and *uncontestable*, are they? I suspect by now you may feel a bit nauseated, perhaps like an obedient sheep who has blindly followed a drunken shepherd over a cliff, in that very brief interval between terminal velocity and the rocks just below. Perhaps by now you are beginning to understand that this letter is not a joke. Please try not to take it personally (in fact, perhaps you may want to imagine that the letter has been written to Daly,³ Nicholas Georgescu-Roegen, William Kapp,⁴ Karl Polanyi,⁵ E.F. Schumacher,⁶ Röpke,⁷ Splash,⁸ Norgaard,⁹ Daily,¹⁰ McCauley,¹¹ Farley,¹² Hawken,¹³ Constanza,¹⁴ Olson,¹ Gowdy instead), for this

efficient, and environmental resources are abused due to the economy's unrestrained material growth, parts of traditional economic theory, especially those related to benefit evaluation, will have to be modified. Policy recommendations will be affected in any case because internalization, the panacea of resource misallocations, cannot be more than a temporary solution. Instead of opening the economy, internalization encloses the harmed resource and saves it by abusing excessively other environmental resources (Amir 1994, abstract).

- 1 The policy recommendations of most economists are driven by a view of economic reality embodied in Walrasian general equilibrium theory. Ironically, the Walrasian system has been all but abandoned by leading economic theorists. It has been demonstrated to be theoretically untenable, its basic assumptions about human decision making have been empirically falsified, and it consistently makes poor predictions of economic behaviour. *The current revolution in welfare economics offers opportunities on two related fronts for an evolutionary perspective on human behaviour to reshape economic theory and policy....* Expanding the role of economic analysis beyond stylized market behaviour to focus on well-being (real utility) has far-reaching consequences for microeconomic policy... Abandoning the Walrasian model also means rethinking the microfoundations approach to the economic analysis of sustainability. This opens the door for economists to engage with the growing body of research on the evolution of whole societies (Gowdy 2006, abstract).
- 2 The Socratic maxim that the recognition of our ignorance is the beginning of wisdom has profound significance for our understanding of society.... This fundamental fact of man's unavoidable ignorance of much on which the working of civilization rests has received little attention. Philosophers and students of society have generally glossed it over and treated this ignorance as a minor imperfection which could be more or less disregarded.... Perhaps it is only natural that the scientists tend to stress what we do know; but in the social field, where what we do not know is often so much more important, the effect of this tendency may be very misleading (Hayek 1960, pp 22-23).
- 3 DALY is a professor in the School of Public Policy at the University of Maryland. From 1988 to 1994 he was senior economist in the environment department of the World Bank, where he helped to formulate policy guidelines related to sustainable development. He is a co-founder and associate editor of the journal *Ecological Economics* and has written several books (Daly 2005). Also see Daly 1971.
- 4 1950.
- 5 1944.
- 6 1973.
- 7 2004 ; 2005.
- 8 1999 ; 2007.
- 9 1994 ; Norgaard & Bode 1998.
- 10 1997.
- 11 2006.
- 12 Daly & Farley 2004.
- 13 1994 ; Hawken, Lovins et. Al 2000.
- 14 et al 1997.

critique is as applicable to their positions—and countless others—as it is to yours)....

And since it seems that you may not possess sufficient problem solving skills for “whole-systems” studies, I will make this critical point regarding the false and sandy foundation of “ecological economics” as simple as possible, with two simple figures which compare and contrast the theoretical framework of “ecological economics” with the theoretical framework of *The Funk-Zweikampf Solution*. My five year old son, William, drew them for you, and you will find them in APPENDIX I: THE EARTH.

At the end of m letter to AICIS (mentioned on page 1 of this letter), I noted that, “if this long letter accomplishes nothing else, I hope it has at least irrefutably demonstrated that *we are all islanders, and all inextricably intertwined and inextricably engaged in a non-cooperative game;*” this remark ties into the insightful passage from John Nash’s Ph.D. dissertation on the cover-page of this letter, and I believe it may be fair to infer that Albert Einstein was aware of the nature of the implicit, sub-optimal – yet rational – gambit presented be all Prisoners' Dilemmas: in the complex problem of global economic development, as I have illustrated in our Axioms, the “prisoners” we are unable to communicate with are the unknown and unknowable future, including (1) the future agenda and military capabilities of foreign nations and terrorist organizations, and (2) unknown planetary uncertainties, such human scientific experiments gone awry, super-novas, chaotic orbits, VEI-8 eruptions, and rogue Asteroids. I will also note that a few of critics have pointed out that, later in life, Einstein expressed regret over writing his letters to Roosevelt, but one of the greatest lessons in economics is that revealed-preferences (the choices people make and actions they ultimately take) are far more reliable and useful than stated preferences (the choices people *say* they *would* make, *would like* to make, or *should have* made). Yes, Einstein stated that he made a mistake, but of course his mistake may have been in stating that he had made a mistake!

Although Professor Dasgupta, Mr Gore ,and the growing population of “ecological economics” have rightfully acknowledged that we must fight to protect the relative insularity of our ecology, they have failed to grasp that we must *also* fight to protect the relative insularity of our planet from even greater threats, *and that makes me nervous.*² When an Academy Award and a Nobel Prize are awarded to an individual who is able to popularize evolutionary unstable solutions

1 Et al 1996.

2 What is becoming a scarce resource is any sense of the significance of this welter of information. We are losing the sense of what matters, of the habits of mind that can be traced to a loss of context; abstract ideas are not easily conveyed absent a recognizable embodiment, and the subtext, that which is not said, may be missing (Hayek et al. 1991, p 13).

to problems he does not understand, and, moreover, when a critical mass of highly influential people – such as David Suzuki– are mobilized in this – though perhaps well-intended – but ultimately misguided effort to change behaviours and alter perceptions of reality, it neither bodes well for the future of the United States nor the inhabitants of Earth. For if these individuals did grasp the true nature of the problem, they would understand that the ultimate solution they ostensibly seek – to save our planet – may actually require *greater* consumer consumption, *greater* greenhouse gas emissions, etc: As you are no doubt well aware, although this point seems to pass by many without much consideration, GPS, radar, and other communications systems which they enjoy in their cars, which guide oil tankers, aircraft, and fishermen alike back safely to home port, are almost entirely the fruits of the U.S. and allied forces military R&D. How soon so many of us forget that, on 12 April 1961, Yuri Alekseyevich Gagarin blasted into outerspace in, quite literally, a coldwar era ICBM: consumer spending (and thus greenhouse emissions) is rocket fuel for the military and NASA R&D upon which the future of our civilization depends. But this sentiment does not appear to be on the rise, in fact, I fear it is waning. As Thomas Schelling noted in his 2005 *Sveriges Riksbank Prize Lecture*,

In 1960 the British novelist C. P. Snow said on the front page of the New York Times that unless the nuclear powers drastically reduced their nuclear armaments thermonuclear warfare within the decade was a “mathematical certainty”,¹

and it seems, despite all of our progress, we may be – yet again – enduring this sort of intellectual epidemic which first spread through the United States late 19th century,² but we were fortunate to transition through this problematic period, if I may speculate, with logical investigations out of the Chicago School and other forward thinking American institutions such as Princeton, Yale, Stanford, MIT, NYU, RAND, The Rockefeller Foundation, and The Institute of Advanced Study,³ and it is my hope that these and other institutions will help us transition through this period again.

1 p 365.

2 We seem to be passing through what may be called an exceptional development of the heart without a corresponding development of the head. Through all classes of people there seems to have run a contagious epidemic of sentiment which has arisen from a really high and noble moral purpose. Persons of sensibility, refinement and intelligence have been touched as never before by a strong desire to do for the classes below them. So fine and so lofty has unquestionably been the purpose behind this movement, that it seems ungracious, if not unjust, to hint at a possible improvement in it; and yet the ascertainment of the causes of things and the subsequent remedying of evils can be advanced only by the most rigorous, logical, and scientific investigation. Lofty as the well meaning purpose of many persons may be, still, if founded only on a sentimental basis, it may be as dangerous as error (Laughlin 1892, p 2).

3 Of course I'm limiting my survey to the United States: the extraordinary contributions out of the Scottish Enlightenment, the Austrian

In closing, Mr President, I will offer that I followed your presentation of the Medal of Freedom Awards three weeks ago with great interest, especially your words in honour of General Peter Pace;¹ in fact, I have been invariably drawn to these great Awards since 1991, the year your father presented the a Medal of Freedom to F.A. von Hayek.² If it not too much to ask, I would be grateful if you are able to share these words of thanks with your father, since, despite their accolades and achievements, as other writers have rightly noted, the teachings of Hayek and his close friend and fellow Austrian, Sir Karl Popper have not received due attention, and I doubt I will ever be able to adequately express my debt to their contributions - but I will attempt to do so in this brief valediction:³

If I have seen farther, it is by standing on the shoulders of giants, wrote Isaac Newton in a letter to Robert Hooke in 1676. Although Newton was referring to his discoveries in optics rather than his more important work on gravity and the laws of motion, it is an apt comment on how science, and indeed the whole of civilization, is a series of incremental advances, each building on what went on before...

But... our understanding doesn't advance just by slow and steady building on previous work. Sometimes as with Copernicus and Einstein, we have to make the intellectual leap to a new world picture. Maybe Newton should have said, "*I used the shoulders of giants as a springboard.*"⁴

And in my feeble attempt to express my gratitude to these great defenders of freedom, I will relate that, on 11

School, the University of Zurich, Humboldt University of Berlin, Cambridge, Oxford, The London School of Economics, Mount Perlin Society, and the highly rationalized problem solving skills which developed through centuries of relatively homogeneous Norse and Japanese cultural evolution were certainly, at the very least, all equal or greater, each in their own right.

1 On his final day in uniform, General Pace took a quiet journey to the Vietnam Veterans' Memorial. He searched the names engraved in the sleek granite, and then found a spot where he placed his four stars that had adorned his uniform. Along with those stars he attached notes addressed to the men who died under his first command some four decades ago. The notes said: "These are yours -- not mine. With love and respect, your platoon leader, Pete Pace." General Pace ended his military career the same way that he began it -- with love for his country and devotion to his fellow Marines.

For his selfless service to his country, and for always putting the interests of our men and women in uniform first, I am proud to award the Presidential Medal of Freedom to General Pete Pace (Bush 2008).

2 We honor Professor Friedrich von Hayek for a lifetime of looking beyond the horizon. At a time when many saw socialism as ordained by history, he foresaw freedom's triumph. Over 40 years ago, Professor von Hayek wrote that "the road to serfdom" was not the road to the future or to the political and economic freedom of man. A Nobel laureate, he is widely credited as one of the most influential economic writers of our century. Professor von Hayek is revered by the free people of Central and Eastern Europe as a true visionary, and recognized worldwide as a revolutionary in intellectual and political thought. How magnificent it must be for him to witness his ideas validated before the eyes of the world. We salute him.

The people of the United States are indeed indebted... You have touched us. You have enriched us. You have shaped our Nation's destiny. And you've also shown us the strength and joy of a simple but powerful idea: the idea of freedom (Bush 1991).

3 My present design... is not to teach the method which each ought to follow for the right conduct of his reason, but solely to describe the way in which I have endeavoured to conduct my own.... This tract is put forth merely as a history, or, if you will, as a tale, in which, amid some examples worthy of imitation, there will be found, perhaps, as many more which it were advisable not to follow, I hope it will prove useful to some without being hurtful to any, and that my openness will find some favour with all. It is possible I may be mistaken; and it is but a little copper and glass, perhaps, that I take for gold and diamonds. I know how very liable we are to delusion in what relates to ourselves, and also how much the judgements of our friends are to be suspected when given in our favour (Descartes 1637, pp 1-2).

4 Hawking 2002 ix.

June 2008, just a few minutes past one o'clock in the afternoon, I stood before the small group of searchers remaining in the afternoon of the final day of the AICIS conference and said,

Hello, my name is Matt Funk, I am thirty-nine years old, and I have only solved one significant problem in my entire life. But I am in fact pleased with this result, as the problem that I have solved has remained an open problem in economics for over 2,300 years.¹

First of all, this introductory remark was intended to emphasize the importance of the discovery over the importance of the discoverer,² for I'm well aware of how difficult these lessons are to learn and, even when grasped, how easily they are lost.³

Moreover, on a practical level, for example, there are more deaths per 10,000 drivers here on Prince Edward Island than in any other province in Canada, and I think about this statistic every time my beautiful Canadian wife walks heads off for the Queen Elizabeth Hospital, where she has worked as a registered nurse for the past five years. I also consider this statistic every time I get into the car: I think of my wife, my five year old son, and I also consider the completed and nearly completed solutions I've been working on over the past decade, but have yet to publish. How unfortunate it would be if they all vanished in a blink of an eye? It was with a similar thought⁴ that I sent the following email a few hours prior to boarding my flight from Stockholm last month:

1 Funk 2008b.

2 All the great... scientists were intellectually modest; and Newton speaks for them all when he says: 'I do not know what I may appear to the world, but to myself I seem to have been only a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.'"

Moreover, all the great scientists realized that every solution to a scientific problem raises many new and unsolved problems. Our knowledge of our ignorance, becomes increasingly conscious, detailed and precise, the more we learn about the world. Scientific research is the best method we have for obtaining information about ourselves and about our ignorance. It leads us to the important insight that there may be great differences between us with regard to minor details of what we may perhaps know, yet we are all equal in our infinite ignorance (Popper 1992, p 40).

3 It is the fact that in [economics] no knowledge can be regarded as established once and for all, and that, in fact, knowledge once gained and spread is often, not disproved, but simply lost and forgotten.... The reason why in our field knowledge can be so lost is, of course, that is never established by experiment, but can be acquired only by following a rather difficult process of reasoning.... The result is that in economics you can never establish a truth once and for all but have always to convince every generation anew (Hayek, Bartley, & Kresge 1991, p 38).

4 [The wise] will start each day with the thought... Fortune gives us nothing which we can really own. Nothing, whether public or private, is stable; the destinies of men, no less than those of cities, are in a whirl. Whatever structure has been reared by a long sequence of years, at the cost of great toil and through the great kindness of the gods, is scattered and dispersed in a single day. No, he who has said 'a day' has granted too long a postponement to swift misfortune; an hour, an instant of time, suffices for the overthrow of empires. How often have cities in Asia, how often in Achaia, been laid low by a single shock of earthquake? How many towns in Syria, how many in Macedonia, have been swallowed up? How often has this kind of devastation laid Cyprus in ruins? We live in the middle of things which have all been destined to die. Mortal have you been born, to mortals have you given birth. Reckon on everything, expect everything (Botton 2000, p 91).

----- Original Message -----

Subject:Re: Greetings from Stockholm!

Date:Tue, 17 Jun 2008 01:11:16 +0000

From:matt@funkisland.org

To:Godfrey Baldacchino <gbaldacchino@upei.ca>

Here's a copy of my final draft - if Fortuna she twist her hand and thwart my efforts to reach the shores of North America again, please do you best to write an introduction, find a publisher, and send proceeds to my son! (Have I mentioned the importance of the theoretical implications this paper presents?!?)
Cheers! Matt

But this is not even the type of loss I fear most. The loss I fear most is the lost of not being discovered, or, rather, not being *accepted*, in the first place. And there are fairly good reasons for this fear.

Throughout history, there have been, essentially two types of economists: those who become rich and famous and those whom parish in poverty and obscurity, and, unfortunately, I am of the latter type.

Why is this so?

Because, as Einstein noted, "Man has an intense desire for assured knowledge. That is why Hume's clear message seemed crushing."¹ Those economists whom recognize and acknowledge Hume's clear message² regularly meet poverty and obscurity, while those whom cater to man's crushing desire for certainty reap fortune and fame.

The Problem of Induction, as we have noted, was first recognized by Hume,³ and Cournot⁴ was the first economist to developed probability theory to the point where he recognized that it was not applicable to economics. Cournot died blind and penniless, while his contemporary, William Stanley Jevons, an economist of nearly no ability, gained fortune and fame for assuring speculators of a connection between sunspots and commodity prices.⁵ And although a tenable solution was finally tabled by Popper (both Popper and Hayek, I will note were two great exceptions to the rule above,

1 Italics mine, Einstein 1956 p 21-22.

2 Ever since the beginning of modern science, the best minds have recognized that 'the range of acknowledged ignorance will grow with the advance of science.' Unfortunately, the popular effect of this scientific advance has been a belief, seemingly shared by many scientists, that the range of our ignorance is steadily diminishing and that we can therefore aim at more comprehensive and deliberate control of all human activities. It is for this reason that those intoxicated by the advance of knowledge so often become the enemies of freedom (Hayek1945).

3 1739

4 1838

5 See Funk 2007.

though they certainly did not find the fortunes of two economists I will shortly note),¹ probability theory and inductive methods remain in the core curriculum of nearly every economics department and continues to provide false foundations for Nobel Laureates, hedge fund managers, and central bankers alike. As Lowenstein keenly observed in *When Genius Failed: The Rise and Fall of Long-Term Capital Management*, his story of two Nobel Laureates, both firm believers and sellers of certainty whom gained fortune, fame, and nearly brought the U.S. and global financial markets to a crashing halt, the “belief that tomorrow’s risks can be inferred by from yesterday’s prices and volatilities prevails at virtually every investment bank and trading desk.”²

In any case, Mr President, it is out of this fear of being lost or not being discovered at all that I have written this letter to you, as I hope that by placing it in your hands it may be more readily preserved.

And if I have indeed been able to see a bit farther, if you, my fellow Americans, and any other fellow inhabitants of Earth should find my discovery of a any meaningful *value*, if I have not mistaken and pyrite and plexi-glass for diamonds and gold,³ then not only will I have done so *without* using the shoulders of these two Austrian intellectual giants as springboards,⁴ for I will have done so without yet climbing within sight of their shoulders.

Moreover, despite the fact that these men were often not well-received by the open arms of America, I have

1 1959

2 2000, p 235

3 My present design... is not to teach the method which each ought to follow for the right conduct of his reason, but solely to describe the way in which I have endeavoured to conduct my own.... This tract is put forth merely as a history, or, if you will, as a tale, in which, amid some examples worthy of imitation, there will be found, perhaps, as many more which it were advisable not to follow, I hope it will prove useful to some without being hurtful to any, and that my openness will find some favour with all. It is possible I may be mistaken; and it is but a little copper and glass, perhaps, that I take for gold and diamonds. I know how very liable we are to delusion in what relates to ourselves, and also how much the judgements of our friends are to be suspected when given in our favour (Descartes 1637, pp 1-2).

4 Most economists enter this market in ney ideas, let me emphasize, in order to obtain ideas and methods for the applications they are making of economics to the thousand problems with which they are occupied: these economists are not the suppliers of new ideas but only demanders. Their problem is comparable to that of the automobile buyer: to find a reliable vehicle. Indeed, they usually end up by buying a used, and therefore tested, idea.

Those economists who seek to engage in research on the new ideas of the science - to refute or confirm or develop or displace them - are in a sense both buyers and sellers of new ideas. They seek to develop new ideas and persuade the science to accept them, but they also are following clues and promises and explorations in the current or preceding ideas of the science. It is very costly to enter this market: it takes a good deal of time and thought to explore a new idea far enough to discover its promise or its lack of promise. The history of economics, and I assume of every science, is strewn with costly errors: of ideas, so to speak, that wouldn't run far or carry many passengers (Stigler 1982, pp 529-530).

sufficient reason to believe they admired our nation, our independence,¹ and the safe anchorage we provided for independent thinkers and intellectual rebels² such as they:

In 1949 I received an invitation to give the William James Lectures at Harvard. This led to my first visit to America, and it made a tremendous difference to my life....

I liked America from the first, perhaps because I had been somewhat prejudiced against it. There was in 1950 a feeling of freedom, of personal independence, which did not exist in Europe and which, I thought, was even stronger than in New Zealand, the freest country I knew....

The greatest and most lasting impact of our visit was made by Einstein. I had been invited to Princeton, and read in a seminar a paper on "Indeterminism in Quantum Physics and in Classical Physics", an outline from a much longer paper. In the discussion Einstein said a few words of agreement, and Bohr spoke at length (going on until we were the only two left)... The fact that Einstein and Bohr came to my lecture I regard as the greatest compliment I have ever received.

I learned to my surprise that Einstein thought my suggestions concerning simplicity (in *Logic der Forschung*) had been universally accepted, so that everybody now knew that the simpler theory was preferable because of its greater power of excluding possible states of affairs; that is, its better testability....

It is difficult to convey the impression made by Einstein's personality. Perhaps it may be described by saying that one felt immediately at home with him, his good sense, his wisdom, and his almost childlike simplicity. *It says something for our world, and for America, that so unworldly a man not only survived, but was appreciated and so greatly honoured* [Italics mine, Popper 1992, pp 146 – 152].

And finally, Mr President, if I may offer a personal note: I realize you have been faced with difficult strategic

1 On July 4, 1776, our Nation's Founders declared "That these United Colonies are, and of Right, ought to be free and Independent States." This declaration marked a great milestone in the history of human freedom. On the 230th anniversary of the signing of the Declaration of Independence, we pay tribute to the courage and dedication of those who created this country, and we celebrate the values of liberty and equality that make our country strong.

The patriots of the Revolutionary War acted on the beliefs that "all men are created equal" and "that they are endowed by their Creator with certain unalienable Rights." By advancing these ideals, generations of Americans have unleashed the hope of freedom for people in every corner of the world.

As we celebrate our independence, Americans can take pride in our history and look to the future with confidence. We offer our gratitude to all the American patriots, past and present, who have sought to advance freedom and lay the foundations of peace. Because of their sacrifice, this country remains a beacon of hope for all who dream of liberty and a shining example to the world of what a free people can achieve. May God continue to bless the United States of America.

NOW, THEREFORE, I, GEORGE W. BUSH, President of the United States of America, by virtue of the authority vested in me by the Constitution and laws of the United States, do hereby proclaim July 4, 2006, as Independence Day. I call upon the people of the United States to observe with all due ceremony our Independence Day as a time to honor our Founders and their legacy of freedom and remember with thankfulness the sacrifice of our men and women in uniform.

IN WITNESS WHEREOF, I have hereunto set my hand this twenty-six day of June, in the year of our Lord two thousand six (Bush 2006).

2 Einstein's genius reminds us that a society's competitive advantage comes not from teaching the multiplication or periodic tables but from nurturing rebels.... And, as recent research into Einstein's personal papers shows, there's no better glimpse into his offbeat creativity than the way he puzzled out the special theory of relativity.... *Einstein alienated so many professors that he was unable to earn a doctorate, much less land an academic job* [italics mine]. At the age of 26, he was working as a third-class examiner at the Swiss patent office in Bern.... *Other scientists had come close to his insight, but they were too confined by the dogmas of the day* [italics mine]. Einstein alone was impertinent enough to discard the notion of absolute time, one of the sacred tenets of classical physics since Newton. "Imagination is more important than knowledge," Einstein later said. Indeed, if we are ever going to unravel the further mysteries of dark matter, come up with a unified theory, or discover the true nature of energy, we should carve that proclamation above all of our blackboards (Isaacson, 2007, pp 35-36).

decisions over the past eight years, and I want to let you know that, after thinking about these and other strategic, theoretical, and practical implications while completing the formulation of the theory of value based upon relative insularity which I have enclosed herewith, I called my father in Chicago last month to tell him about my exciting discovery, and at the end of this conversation, I told him something he had never heard me say before: I told him I was proud to be an American.

“You should be,” my father said without hesitation, “it’s a great country.”

Sincerely,

(Matt Funk)

APPENDIX I: THE EARTH¹



Figure 1

This excellent drawing represents the theoretical framework of “ecological economics.”

The blue represents the Earth, the biosphere and all of its inter-connected systems, which are, naturally, beholden to the second law of thermodynamics.

Although “ecological economists” refer to this as a “whole-systems” approach; as you will see in Fig. 2, they “forgot” two systems.

This framework is represented in Axioms I-III.²

1 Funk 2008a. Artwork courtesy of William Matthew Funk © 2008.

2 See APPENDIX I.

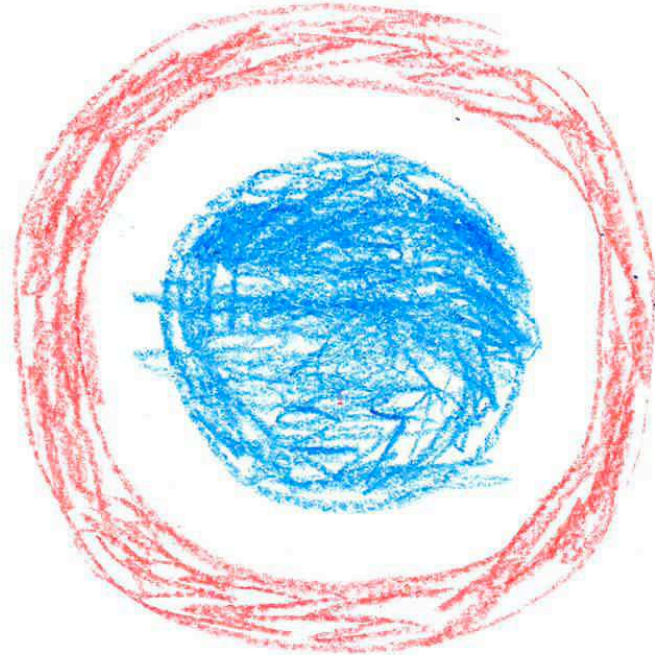


Figure 2

This excellent drawing represents the theoretical framework of *The Funk-Zweikampf Solution*.

Note that, in addition to the axioms represented in the previous drawing (in blue), this framework also recognizes two additional, fundamental assumptions:

(1) *political uncertainty* (white), and (2) *planetary uncertainty* (red).

As you can see, this is the “bigger picture,” so to speak.

This framework is represented in Axioms I-VI.¹

¹ See APPENDIX I.

ABBREVIATIONS & DEFINITIONS

Asteroid Tugboat

An Asteroid Tugboat... is a fully controlled asteroid deflection concept using a robotic spacecraft powered by a high efficiency, electric propulsion system (ion or plasma) which docks with and attaches to the asteroid, conducts preliminary operations, and then thrusts continuously parallel to the asteroid velocity vector until the desired velocity change is achieved. Based on early warning, provided by ground tracking and orbit prediction, it would be deployed a decade or more prior to a potential impact.¹

Axiom

“Fundamental Ideas”... are the sources of necessary truths (sometimes called “Axioms”).²

Byr

Billion Years

ESS

Evolutionary Stable Strategy

Maynard Smith and Price (1973) introduced the concept of an evolutionarily stable strategy (ESS). Initially they were not aware of the relationship between the concept of an ESS and that of a Nash equilibrium. Rational game theory looked at mixed strategies as produced by conscious randomization. Nash’s interpretation of a mixed equilibrium as a mass action phenomenon was buried in his unpublished dissertation and not found in textbooks on game theory. In biology the mass action interpretation is very natural and guided the work on evolutionary stability already from its beginning.... They defined an ESS as a strategy prescribed by a symmetric equilibrium point.³

Funk-Zweikampf Solution

Our strategic solution is derived through the axiomatic application of our unified theory of value of the biological and social sciences,⁴ generated through the discovery that *Value* (V) is a derivative function of *relative insularity* (I_R): $V = f'(I_R)$.

I_R is formulated with the following variables: *Land Area* (km^2), *Elevation* (m), *Distance from nearest Continent* (km), *Distance from nearest Neighbour* (km), *Nearest Neighbour Land Area* (km^2), *Renewable Water Resources* ($m^3/person/year$), *Population Density* (p/km^2), *Exclusive Economic Zone Area* (km^2), *International Airports* (n), *Deep Water Harbours* (n), *Marine Links*, (n) *Land Links* (n), *Forests* ($\% km^2$), *Commercial Agriculture* ($\% km^2$), *Organic Agriculture* ($\% km^2$), *Subsistence Agriculture* ($\% km^2$), *Nature Preserve* ($\% km^2$), *Tourist Visits* (p/yr), *Irrigation* ($m^3/person/year$ & $\% km^2$), *Industrial Water Consumption* ($m^3/person/year$), *Organic Water Pollutants* ($grammes/p/day$), *Food Imports* ($\%$), and the following four qualitative inputs: *Sovereign Status*, *Constitutional Balance*, *Cultural Homogeneity*, and *Military Power*. We calibrate our formulae by adjusting relative input weighting in accordance a positive, linear biogeographical correlation between I_R and the average human life expectancy for the corresponding politico-biogeographic area.⁵

GEMS

Globalized Economic Military Superpowers

Presently, the USA represents the only true player in this arena, but our definition includes all five signatory members of the UK-USA agreement (UK, USA, Canada, Australia, and New Zealand), often referred to as AUSCANZUKUS, and six other nations which have developed, detonated, and presently maintain nuclear weapons (Russia, France, China, India, Pakistan, and North Korea).

1 Schweickart et. al., 2003, abstract.

2 Whewell 1837, reprinted in Butts 1968, p 5.

3 Selten 1994, p 168

4 See APPENDIX I

5 Funk 2008a

Prisoner's Dilemma

(a) Al Tucker was on leave at Stanford in the Spring of 1950 and, because of the shortage of offices, he was housed in the Psychology Department. One day a psychologist knocked on his door and asked what he was doing. Tucker replied: "I'm working on game theory.", and the psychologist asked if he would give a seminar on his work. For that seminar, Al Tucker invented the Prisoner's Dilemma as an example of game theory.¹

(b) The Prisoner's Dilemma... is a game where two players have the option to cooperate or to defect. If both cooperate they receive the reward, R . If both defect they receive the punishment, P . If one cooperates and the other defects, then the cooperator receives the sucker's payoff, S , while the defector receives the temptation, T . The Prisoner's Dilemma is defined by the ranking $T > R > P > S$.

Would you cooperate or defect? Assuming the other person will cooperate it is better to defect, because $T > R$. Assuming the other person will defect it is better to defect, because $P > S$. Hence, no matter what the other person will do it is best to defect. If both players analyze the game in this rational way then they will end up defecting. The dilemma is that they both could have received a higher payoff if they had chosen to cooperate. But cooperation is irrational.²

(c) This "collective-risk social dilemma" exists in various social scenarios, the globally most challenging one being...climate change.³

Problem of Induction⁴

[Problem:] Our foregoing method of reasoning will easily convince us, that *there can be no demonstrative arguments to prove, that those instances, of which we have had no experience, resemble those, of which we have had experience.*⁵

[Solution:] According to a widely accepted view... the empirical sciences can be characterized by the fact that they use 'inductive methods', as they are called. According to this view, the logic of scientific discovery would be identical with inductive logic, i. e. with the logical analysis of these inductive methods. It is usual to call an inference 'inductive' if it passes from singular statements (sometimes also called 'particular' statements), such as accounts of the results of observations or experiments, to universal statements, such as hypotheses or theories. Now it is far from obvious, from a logical point of view, that we are justified in inferring universal statements from singular ones, no matter how numerous; for any conclusion drawn in this way may always turn out to be false: no matter how many instances of white swans we may have observed, this does not justify the conclusion that all swans are white.

The question whether inductive inferences are justified, or under what conditions, is known as the problem of induction. The problem of induction may also be formulated as the question of the validity or the truth of universal statements which are based on experience, such as the hypotheses and theoretical systems of the empirical sciences...

Scientific statements can only attain continuous degrees of probability whose unattainable upper and lower limits are truth and falsity' [Reichenbach, Erkenntnis 1, 1930, p. 186]. At this stage I can disregard the fact that the believers in inductive logic entertain an idea of probability that I shall later

1 Kuhn 1994, p 161. For A. W. Tucker's version, see APPENDIX IV: THE PRISONER'S DILEMMA.

2 Italics mine, May & McLean, 2007, p 8. Also see APPENDIX I, Cressman 1996, Hauert 2006, Weibull & Salomonsson 2006

3 Milinski et. al. 2008, p 2291.

4 Also see Cournot 1838, Reichenbach 1930, 1966, Reichenbach et. al. 1971, Russell 1903, 1908, 1913, 1919, 1948, Ludwig et. al. 1993, and Wittgenstein 1969. Most works by Popper address this problem from various angles and within variable contexts.

5 Italics mine, Hume 1739, Book I, Vol I, p 137.

reject as highly unsuitable for their own purposes. I can do so because the difficulties mentioned are not even touched by an appeal to probability. For if a certain degree of probability is to be assigned to statements based on inductive inference, then this will have to be justified by invoking a new principle of induction, appropriately modified. And this new principle in its turn will have to be justified, and so on.

Nothing is gained, moreover, if the principle of induction, in its turn, is taken not as 'true' but only as 'probable'. In short, like every other form of inductive logic, the logic of probable inference, or 'probability logic', leads...to an infinite regress.¹

(*exempli gratia*: a) There is dangerous innocence in the expectation of a future formed on the basis of probability. Any accident to which a human has been subject, however rare, however distant in time, is a possibility we must ready ourselves for.²

(*exempli gratia*: b) The assumption that economists can find predictable solutions to economic problems is undoubtedly the most inhibiting force in... economics. It has led to the increasing isolation of theoretical economists from the day-to-day practitioners of the subject—the actual participants in an economy, the consumers and the producers.³

(*exempli gratia*: c) There is a problem in inference well-known as the problem of induction. It is a problem that has been haunting science for a long time, but hard science has not been as harmed by it as the social sciences, particularly economics, even more the branch of financial economics.⁴

(*exempli gratia*: d) Kant, in his *Critique of Pure Reason*, asserted under the influence of Hume that pure speculation or reason, whenever it ventures into a field in which it cannot possibly be checked by experience, is liable to get involved in contradictions or 'anti-anomies' and to produce what he unambiguously described as 'mere fancies' ; 'nonsense' ; 'illusions' ; 'a sterile dogmatism' ; and 'a superficial pretension to the knowledge of everything.'⁵

(*exempli gratia*: e) We shall never attain scientific consensus concerning the systems that are being exploited. There have been a number of spectacular failures to exploit resources sustainably, but to date there is no agreement about the causes of these failures....

The great difficulty in achieving consensus concerning past events and a fortiori in prediction of future events is that controlled and replicated experiments are impossible to perform in large-scale systems....

Once we free ourselves from the illusion that science or technology (if lavishly funded) can provide a solution to resource or conservation problems, appropriate action becomes possible.⁶

RIS

Relatively Insular States

This category includes sovereign island nations, sub-national island jurisdictions, insular provinces (i.e. Newfoundland & Labrador), states (i.e. Hawaii), municipalities (i.e. Vancouver Island), and relatively insular jurisdictions (i.e. The Alpine Convention region) Given relative insularity (see Axiom VII), we divide geopolitical regions into (1) RIS and (2) GEMS, but in reality, naturally, the true relative insularity of each region lies along a sliding scale with a true GEMS at one end (the United States) and a true RIS, such as the big island of Hawaii at the other.⁷

Strategic Equilibrium

What do I mean by "strategic equilibrium"? Very roughly, the players in a game are said to be in *strategic equilibrium* (or simply *equilibrium*) when their play is *mutually optimal*: when the actions and plans of each

1 Popper 1959, pp 31-35.

2 Botton 2000, p 90.

3 Hayek 1991, p 9.

4 Taleb 2004, p 117.

5 Popper, 1945, vII, p38.

6 Ludwig et. al. 1993.

7 Funk 2008a

player are rational in the given strategic environment – i.e., when each knows the actions and plans of the others. For formulating and developing the concept of strategic equilibrium, John Nash was awarded the 1994 Prize in Economics Sciences in Memory of Alfred Nobel, on the fiftieth anniversary of the publication of John von Neumann and Oskar Morgenstern's *Theory of Games and Economic Behavior*.¹

Theory

Every scientific theory is a system of sentences...or ASSERTED STATEMENTS or, for short, simple STATEMENTS.²

Tragedy of the Commons

(a) William Forster Lloyd (1794-1852)... made a lasting if long unrecognized mark in economics... From 1832 to 1837 Lloyd held the Drummond chair of political economy at the University of Oxford. A collection of his lectures... were first published in 1833 in Oxford under the title *Two Lectures on the Checks to Population*.... The chief original contribution in Lloyd's discussion of population issues is his recognition and incisive analysis of the deleterious consequences that ensue “when the constitution of society is such that as to diffuse the effects of individual acts throughout the community at large, instead of appropriating them to the individuals, by whom they are respectively committed.” Lloyd's discussion of this problem... [is] best known to modern readers through Garrett Hardin's influential 1968 article... “*The Tragedy of the Commons*”.³

(b) It is fair to say that most people who anguish over the population problem are trying to find a way to avoid the evils of overpopulation without relinquishing any of the privileges they now enjoy.⁴ They think that farming the seas or developing new strains of wheat will solve the problem -- technologically. I try to show here that the solution they seek cannot be found. The population problem cannot be solved in a technical way, any more than can the problem of winning the game of tick-tack-toe (Hardin 1968).

(c) Scientific certainty and consensus in itself would not prevent overexploitation and destruction of resources. Many practices continue even in cases where there is abundant scientific evidence that they are ultimately destructive. An outstanding example is the use of irrigation in arid lands. Approximately 3000 years ago in Sumer, the once highly productive wheat crop had to be replaced by barley because barley was more salt-resistant. The salty soil was the result of irrigation. E. W. Hilgard pointed out in 1899 that the consequences of planned irrigation in California would be similar. His warnings were not heeded. Thus 3,000 years of experience and a good scientific understanding of the phenomena, their causes, and the appropriate prophylactic measures are not sufficient to prevent the misuse and consequent destruction of resources.⁵

1 All italics Aumann's 2005, p 352.

2 Tarski 1941, p 3.

3 Population Council 1980, p 473

4 To keep downtown shoppers temperate in their use of parking space we introduce parking meters for short periods, and traffic fines for longer ones. We need not actually forbid a citizen to park as long as he wants to; we need merely make it increasingly expensive for him to do so. Not prohibition, but carefully biased options are what we offer him. A Madison Avenue man might call this persuasion; I prefer the greater candor of the word coercion.

Coercion is a dirty word to most liberals now, but it need not forever be so. As with the four-letter words, its dirtiness can be cleansed away by exposure to the light, by saying it over and over without apology or embarrassment. To many, the word coercion implies arbitrary decisions of distant and irresponsible bureaucrats; but this is not a necessary part of its meaning. The only kind of coercion I recommend is mutual coercion, mutually agreed upon by the majority of the people affected.

To say that we mutually agree to coercion is not to say that we are required to enjoy it, or even to pretend we enjoy it. Who enjoys taxes? We all grumble about them. But we accept compulsory taxes because we recognize that voluntary taxes would favor the conscienceless. We institute and (grumblingly) support taxes and other coercive devices to escape the horror of the commons (Hardin 1968).

5 Ludwig et. al. 1993.

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- Abstract:** Fisheries are subject to a deep-rooted problem of economic inefficiency, often referred to as the fisheries problem. The fisheries problem derives fundamentally from inappropriate social institutions controlling the fishing activity, the foremost of which is the common property arrangement. Fisheries management consists of replacing these institutions with more appropriate ones. Which institutions are most appropriate depends on the social objectives of the fisheries. There are strong economic arguments for the view that there should be only a single objective, namely to maximize the present value of the flow of benefits from the fisheries. In reality, different interest groups often push for several, often conflicting, objectives. In that case a multi-objective programming approach may be appropriate. A set of institutions to manage fisheries is referred to as the fisheries management regime. The fisheries management regime consists of a (i) fisheries management system, (ii) fisheries enforcement system and (iii) fisheries judicial system. Each one of these has to be appropriately designed and implemented. The efficacy of the overall fisheries management regime cannot be greater than that of its weakest link. At the same time it is of the greatest importance to keep an eye on the cost of fisheries management. Global evidence suggests that the cost of fisheries management often constitutes a substantial fraction of the value of the harvest. The problem, thus, is to strike the right balance between the efficacy of the fisheries management regime and its cost of design, implementation and operation. The problem of fisheries management is by its nature multidisciplinary. It involves marine ecology and biology, mathematics, economics, game theory, political science and anthropology to name a few. The problem is, moreover, typically quite complex, requiring powerful modelling and calculation techniques. In many respects this is the kind of problem operations research techniques are designed to deal with.
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1. The Confederation Bridge, linking Prince Edward Island (PEI) to New Brunswick (NB) across the Northumberland Strait... has probably been the most keenly debated and most traumatic event in the modern history of PEI, Canada's smallest province (Calhoun 1989; Weale 1991; Begley 1993; Shea 1993; Johnston 1995; Macdonald 1997) (p 329).
 2. In *A Geography of Islands*, Royle dedicates the first photo in his book to the 14-km Confederation Bridge, linking PEI (and its 140,000 citizens) to mainland New Brunswick since 1997 (Royle 2001, 13). To judge from the lead-up, many Islanders held high hopes from the completed structure. 'Our Island province is about to experience a transition to a new frontier of vigorous expansion and renewed community vitality,' PEI Premier Pat Binns predicted at the official opening. 'Our traditional sectors of agriculture and the fishery will be enhanced by a marked improvement in transportation infrastructure (Journal-Pioneer 1997).
- The decision to bridge the gap (that is, the Northumberland Strait) was by no means universally popular, however (Royle 2001, 114; Begley 1993). Prominent islanders like Betty Howatt campaigned vigorously against the bridge—because she saw 'a loosening of the social fabric in the province' and claimed that 'people no longer have that sense of place that they once had' (The Guardian, PEI, 8 November 2003). In a January 1988 plebiscite, 40 percent of islanders voted against a fixed link. For many of these, a fixed attachment was a violation of a natural order of things; a forced and permanent alternation of an intimate and fundamental spatiality (e.g., Weale 1991, 82). A key perceived threat was to the impact that a bridge would have on the island's unique and distinct 'way of life.' The latter may escape definition, although Ansel Ferguson, an island fisherman, describes it as 'a little more friendliness, a little more community, a little less crime' (Calhoun 1989, 19). Critics argued that easy access to the island province would damage the tranquility, natural beauty and charm of island life. Islanders did not want the green fields and red soil to be tarnished by the hotdog stands and jukebox joints that would transform the place into another Coney Island (CBC 2002). A fixed connection would allow New Brunswick and Nova Scotia firms to truck their

products more efficiently to PEI, as well as encourage Islanders to go shopping in such places as Moncton or Halifax, undercutting the island's smaller producers and retail outlets. Fishers complained that any solid structure in the strait would affect fish stocks, shellfish beds and especially lobster (FEARO 1990, 13) (p 329).

3.

For an island that depends so much on its natural resources (sea, land) and their scapes and symbolism (through tourism) to support its economy, it is not surprising that much concern was raised on the environmental impact of the bridge, especially in the sensitive Northumberland Strait. There are now tell tale signs of 'ecological collapse' in that stretch of water (Gustafson 2006). Many are claiming that the bridge is to blame for a 'sick strait' (e.g., CBC 2006)....The Federal Environmental Assessment Review Office had concluded, in 1990, that '... in terms of the marine ecosystem of the Northumberland Strait, the risks associated with the proposed bridge concept are unacceptable' (FEARO 1990, 14) (pp 321-322).

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1.

Even the official motto belies its aspirations. The motto of Prince Edward Island, *Parva sub ingenti*, "the small under the protection of the great," is an apt metaphor for Canada's smallest province. It is also a bitterly paradoxical expression of the Island's status as a "have not" province, largely dependent on others for its survival, first as a colony under British rule and then as a somewhat reluctant new province of Canada. As Prince Edward Island comes to the end of the 20th century, the goal of greater self-sufficiency and self-reliance remains as elusive as ever (p 175).

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1.

The perverse effects frequently attributed to the welfare state are easy to interpret from a behavioral perspective. If people overestimate the magnitude of immediate benefits relative to more distant ones, you can actually – on net – harm them by offering them additional immediate benefits. They already tend to under-invest. Making their present more livable with cash gifts only amplifies this tendency. Similarly, if individuals systematically overestimate their own abilities, you could easily harm a student by admitting him to a program for which he is under-qualified. Blinded by over-confidence, he would be likely to select the best school that accepted him, scarcely considering the possibility that he will be out of his league. Looking at the welfare state from a behavioral standpoint lays the groundwork for a stronger claim: Potential welfare recipients' deviations from neoclassical assumptions tend to be especially pronounced. If the average American falls short of the neoclassical ideal, the average recipient of government assistance does not even come close (p 487).

2.

To the best of our knowledge, this is the first paper to analyze the connection between behavioral economics and what Tyler Cowen calls the 'traditional conservative critique of the welfare state.' Most detractors of the welfare state have turned to neoclassical economics for intellectual support. Few promoters of behavioral economics have stopped to consider its implications for poverty policy. Our paper aims to reverse both of these trends. Some of the most common complaints about the welfare state are, from a strict neoclassical perspective, senseless. But from the standpoint of behavioral economics, they are quite coherent. Moreover, even though behavioral economists have given policy towards the disadvantaged short shrift, this turns out to be a topic where behavioral findings are especially relevant. A variety of sources indicate that 'the poor deviate more.' If the average person violates neoclassical assumptions, the average welfare recipient violates them to a markedly greater degree....

Once you accept the idea that you can hurt people by giving them more choices, you cannot dismiss the idea that you can help them by taking some of their choices away. In practice, of course, the latter is much more costly and intrusive than the former (Glaeser 2006) (p 503).

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- 1.
- WHEN on board H.M.S. Beagle, as naturalist, I was much struck with certain facts in the distribution of the inhabitants of South America, and in the geological relations of the present to the past inhabitants of that continent. These facts seemed to me to throw some light on the origin of species — that mystery of mysteries, as it has been called by one of our greatest philosophers. On my return home, it occurred to me, in 1837, that something might perhaps be made out on this question by patiently accumulating and reflecting on all sorts of facts which could possibly have any bearing on it. After five years' work I allowed myself to speculate on the subject, and drew up some short notes (p 1).
- 2.
- It is interesting to contemplate an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent on each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the external conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved (pp 489-490).
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The paradox has often been noted that the first edition of *The Origin of Species* makes a better case than the sixth. This is because Darwin felt obliged, in his later editions, to respond to contemporary criticisms of the first edition, criticisms which now seem so dated that the replies to them merely get in the way, and in places even mislead (p xvi).

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1.
The advent of wide spread internet publishing reduces the stifling impact of the refereeing process on the papers accepted and submitted to journals. Economics scholars are less bound to devote a large part of their time and effort on formalisms. They have more leeway to concentrate on matters of content. This greater freedom also improves the chances that the advice and suggestions proposed by economic methodologists are put into practice, provided they are of practical use for research. The dominance of orthodoxy is reduced. But at the same time the competition between papers is intensified, so that only methodological concerns held to be useful by practical economists have an impact on the profession (p 9).
- Frey, B. S. (2002). *Publishing as Prostitution? Choosing Between One's Own Ideas and Academic Failure*. Published in: Public Choice Vol. 116, 2003, 205-223: Institut für Empirische Wirtschaftsforschung, Universität Zürich.
- Abstract:** Survival in academia depends on publications in refereed journals. Authors only get their papers accepted if they intellectually prostitute themselves by slavishly following the demands made by anonymous referees without property rights on the journals they advise. Intellectual prostitution is neither beneficial to suppliers nor consumers. But it is avoidable. The editor (with property rights on the journal) should make the basic decision of whether a paper is worth publishing or not. The referees only give suggestions on how to improve the paper. The author may disregard this advice. This reduces intellectual prostitution and produces more original publications.
- Frey, B. S. (2007). Evaluierungen, Evaluierungen ... Evaluitis. *Perspektiven Der Wirtschaftspolitik*, 8(3) 207-220.
- Abstract:** In the sciences the outside evaluation of past performances of universities, faculties, departments, research groups and of individuals has become more and more frequent, nearly incessant. It could be said that the sciences are afflicted with Evaluitis, a creeping and widespread illness. Besides the obvious costs that arise for those being evaluated and for those doing the evaluation there are additional costs that weigh heavily but are usually disregarded: incentives are distorted systematically and ossification is promoted. Furthermore, the whole decision approach is wrongly conceived. For these reasons there are too many and too thorough evaluations. A useful alternative is an appropriate design of institutions guiding incentives and a careful selection of persons - who thereafter should be free to pursue their tasks.
- Frey, B. S., & Eichenberger, R. (1992). *The Political economy of stabilization programmes in developing countries*. Paris: OECD Development Centre.
- Frey, B., & Bohnet, I. (1997). Identification in democratic society. *Journal of Socio-Economics*, 26(1), 25-38.
- Abstract:** Identification increases cooperation and fairness ("other-regarding" behaviour) in Prisoner's Dilemma and Dictator Games. While

identification explains all the difference in behaviour in nonstrategic interactions, face-to face communication further raises cooperation in strategic settings. This “cooperation-increasing” effect must be traded-off against the “equality-decreasing” effect of communication. Allowing for partial communication only—which prevails in large number settings—our experimental results indicate that discussion produces unequal distributions of outcomes to the disadvantage of those excluded from the interaction. Substituting identification for communication is relevant in democracy for all distributive questions and for public good type settings if equality is valued higher than a partial increase of “other-regardness.”

Frey, B. S., & Stutzer, A. (2000). Happiness, Economy and Institutions. *The Economic Journal*, 110(466), 918-938.

Abstract: Institutional factors in the form of direct democracy (via initiatives and referenda) and federal structure (local autonomy) systematically and sizeably raise self-reported individual well-being in a cross-regional econometric analysis. This positive effect can be attributed to political outcomes closer to voters' preferences, as well as to the procedural utility of political participation possibilities. Moreover, the results of previous microeconomic well-being functions for other countries are generally supported. Unemployment has a strongly depressing effect on happiness. A higher income level raises happiness, however, only to a small extent.

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- - - . (2007a). *On the problem of hollywood economics: de vany's error—george lucas knows something*. FIND Working paper.

Abstract: Hayek (1991) lamented the difficulty in distinguishing between economics and excrement, and Hemingway (1958) noted “The most essential gift for a good writer is a built-in, shock-proof, bullshit detector.” In this spirit and within the context of Frankfurt's (2004) *Theory of Bullshit*, this paper constructs a bullshit detector for economics. This apparatus is carefully calibrated to detect the Seven Deadly Sins of 'Hollywood Economics': Hubris, Intellectual Dishonesty, Greed, Mathematical Mania, Physics Fetishes, Conditions of Emptiness, and Sunspots. We trace the philosophical and methodological origin of these traits to its source, *The Problem of Induction*, then illustrate with examples from Plato to the present, including detailed analysis from the illuminating cases of Long Term Capital Management and William Stanley Jevons' sunspot theory. Furthermore, we demonstrate the contemporary effectiveness of this apparatus by detecting hereto undetected economic bullshit, namely Arthur de Vany's (2004) *Hollywood Economics: How Extreme Uncertainty Shapes the Film Industry*. In the process, we falsify de Vany's 'Nobody knows anything' theory and advance our replacement theory: *George Lucas knows something*.

- - - . (2007b). *On the problem of global warming: a brief history of a new & unpopular theory in an open letter to john gillis*. FIND working paper.

Abstract: Funk's (forthcoming) theory of *The Problem of Global Warming* forwards the hypothesis that 'global warming' is not in fact limited to ecological distress induced through the consumption of superheating fossil fuels—but that is merely a *single symptom* of far more significant problems, which stem from the *Problem of Induction*. This paper traces the history, evolution, and development of this new and unpopular theory.

- - - . (2007c). *On the problem of dependent people: natural resource valuation errors in atlantic canadian island jurisdictions*. FIND working paper.

- - - . (2006d). *Personal Correspondence*.

-----Original Message-----

From: Matt Funk <Mfunk@upei.ca>

To: Doherty, Peter

Sent: Sun Oct 28 20:44:21 2007

Subject: Thomas Kuhn & Karl Popper

Greetings Dr Doherty...I am researching a theory that the rejection of Karl Popper's logic and methods and general acceptance (in a popular sense) of Thomas Kuhn's logic and methods have been detrimental to science, especially social sciences such as economics.

Nearly a dozen Nobel Laureates have thanked Popper and acknowledged his great influence upon their work: most notably, of course, is F.A. von Hayek's Sveriges Riksbank Prize Lecture and, perhaps the most notable example in your field may be revealed in Eccles' Nobel biography.

I have only been able to discover one Nobel Laureate who acknowledged Kuhn's influence and, curiously, this noble individual (whom of course is you!) acknowledged both Popper and Kuhn: "I was influenced early on by reading Arthur Koestler and Edward de Bono, and more recently by the writings of Karl Popper and Thomas Kuhn."

So, naturally, I'm very curious to know if, after nearly a decade, the balance of this influence or your opinions regarding these two philosophers of science has changed?

I thank you very much for your time and consideration regarding this matter, as I am inclined to believe the long-term prospects of human survival may hang in the balance to the ultimate answer to this debate.

Any words of wisdom you are able to offer on this topic would be greatly appreciated.
Sincerely...Matt Funk

From:Doherty, Peter
To:Mfunk@upej.ca
Date:10/28/07 11:58 pm
Subject: Re: Thomas Kuhn & Karl Popper

A long time since I've read either. Popper's views re falsification of a null hypothesis seem correct to me. Much of the world's worst science is done by people who are determined to prove a point. Kuhn's idea of the paradigm shift is spot on.

Peter C. Doherty,
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--- . (forthcoming). On the problem of global warming: a solution for william funk, albert gore and richard branson. 1156 pages.

Abstract: This exhaustive manuscript presents a solution to *The Problem of Global Warming*. Our discovery concludes that, contrary to popular opinion, "The Problem of Global Warming," is not ecological distress due to the superheating of the Earth, it is merely a single symptom of far more significant, inter-related problems, which are synonymous to *The Problem of Sustainable Economic Development*.

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Abstract: The greatest natural threat to the long-term survivability of mankind is an asteroid or comet impact with the Earth. SHIELD is an architectural concept for a comprehensive Earth defense system designed to discover, catalog, calculate orbits of near-Earth objects, and to deflect potential impactors. SHIELD consists of Sentries, Soldiers, and an Earth Control Center. Sentries are spacecraft designed to search and locate NEOs of all types. Sentries maximize the lead-time for a potential impact, which simplifies the task of the Soldiers to deflect the object. Sentry spacecraft determine the orbit of each object, and compare it with the onboard database of known NEOs. The results are kept in a distributed space-Earth database. Soldier spacecraft deflect or disperse the potential impactor. Several mitigation methods have been compared by their specific impulse. Each technique requires some development to be feasible. These techniques can be categorized into "rendezvous" in which the Soldier physically lands on the NEO and "intercept". The required number of Soldiers and their locations has been examined. SHIELD has clearly shown that an Earth-protection system is practical and that a full system could be built within a few years. Indeed, very capable Sentries can be launched today.

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- Abstract:** Pollinators are required for producing 15–30% of the human food supply, and farmers rely on managed honey bees throughout the world to provide these services. Yet honey bees are not always the most efficient pollinators of all crops and are declining in various parts of the world. Crop pollination shortages are becoming increasingly common. We found that behavioral interactions between wild and honey bees increase the pollination efficiency of honey bees on hybrid sunflower up to 5-fold, effectively doubling honey bee pollination services on the average field. These indirect contributions caused by interspecific interactions between wild and honey bees were more than five times more important than the contributions wild bees make to sunflower pollination directly. Both proximity to natural habitat and crop planting practices were significantly correlated with pollination services provided directly and indirectly by wild bees. Our results suggest that conserving wild habitat at the landscape scale and altering selected farm management techniques could increase hybrid sunflower production. These findings also demonstrate the economic importance of interspecific interactions for ecosystem services and suggest that protecting wild bee populations can help buffer the human food supply from honey bee shortages.



Photo: A wild, native bee (*Svastra obliqua expurgata*) forages on a sunflower. Honey bees that interact with wild, native bees are up to five times more efficient in pollinating sunflowers. Protecting wild bees may help buffer the human food supply from reduced pollination resulting from honey bee shortages. Conservation measures for wild bees include maintaining and restoring natural habitats and adopting bee-friendly farming practices. Image courtesy of Sarah S. Greenleaf.

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Abstract: Economists and psychologists have been testing Nash equilibrium predictions of game theory models of human behavior. In many instances, humans do not conform to the predictions. These results are of great interest to biologists because they also raise questions about well-known ESS models of cooperation. Cooperation in certain one-shot, anonymous interactions, and a willingness to punish others at a net cost to oneself are some of the most intriguing deviations from standard theory. One proposed explanation for these results that is receiving increasing attention invokes the cultural group selection of 'other regarding' social norms. We critically review this explanation. We conclude that experimental results reveal limits in two implicit models of cognitive structure commonly employed by economists and evolutionary biologists.

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Abstract: Social dilemmas and the evolutionary conundrum of cooperation are traditionally studied through various kinds of game theoretical models such as the prisoner's dilemma, public goods games, snowdrift games or by-product mutualism. All of them exemplify

situations which are characterized by different degrees of conflicting interests between the individuals and the community. In groups of interacting individuals, cooperators produce a common good benefitting the entire group at some cost to themselves, whereas defectors attempt to exploit the resource by avoiding the costly contributions. Based on synergistic or discounted accumulation of cooperative benefits a unifying theoretical framework was recently introduced that encompasses all games that have traditionally been studied separately (Hauert, Michor, Nowak, Doebeli, 2005. Synergy and discounting of cooperation in social dilemmas. *J. Theor. Biol.*, in press.). Within this framework we investigate the effects of spatial structure with limited local interactions on the evolutionary fate of cooperators and defectors. The quantitative effects of space turn out to be quite sensitive to the underlying microscopic update mechanisms but, more general, we demonstrate that in prisoner's dilemma type interactions spatial structure benefits cooperation—although the parameter range is quite limited—whereas in snowdrift type interactions spatial structure may be beneficial too, but often turns out to be detrimental to cooperation.

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The peculiar character of the problem of a rational economic order is determined precisely by the fact that the knowledge of the circumstances of which we must make use never exists in concentrated or integrated form, but solely as the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess. The economic problem of society is thus not merely a problem of how to allocate "given" resources if "given" is taken to mean given to a single mind which deliberately solves the problem set by these "data." It is rather a problem of how to secure the best use of resources known to any of the members of society, for ends whose relative importance only these individuals know. Or, to put it briefly, it is a problem of the utilization of knowledge not given to anyone in its totality. This character of the fundamental problem has, I am afraid, been rather obscured than illuminated by many of the recent refinements of economic theory, particularly by many of the uses made of mathematics (pp 519-520).

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1.

It is the fact that in [economics] no knowledge can be regarded as established once and for all, and that, in fact, knowledge once gained and

spread is often, not disproved, but simply lost and forgotten.... The reason why in our field knowledge can be so lost is, of course, that is never established by experiment, but can be acquired only by following a rather difficult process of reasoning.... The result is that in economics you can never establish a truth once and for all but have always to convince every generation anew (p 38).

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Abstract: Varietal data from 27 crop species from five continents were drawn together to determine overall trends in crop varietal diversity on farm. Measurements of richness, evenness, and divergence showed that considerable crop genetic diversity continues to be maintained on farm, in the form of traditional crop varieties. Major staples had higher richness and evenness than nonstaples. Variety richness for clonal species was much higher than that of other breeding systems. A close linear relationship between traditional variety richness and evenness (both transformed), empirically derived from data spanning a wide range of crops and countries, was found both at household and community levels. Fitting a neutral "function" to traditional variety diversity relationships, comparable to a species abundance distribution of "neutral ecology," provided a benchmark to assess the standing diversity on farm. In some cases, high dominance occurred, with much of the variety richness held at low frequencies. This suggested that diversity may be maintained as an insurance to meet future environmental changes or social and economic needs. In other cases, a more even frequency distribution of varieties was found, possibly implying that farmers are selecting varieties to service a diversity of current needs and purposes. Divergence estimates, measured as the proportion of community evenness displayed among farmers, underscore the importance of a large number of small farms adopting distinctly diverse varietal strategies as a major force that maintains crop genetic diversity on farm.

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1.

In intellectual circles Popper was very much admired. But because *The Open Society and Its Enemies* was hostile to so much academic pretension it was treated less than respectfully by those in the various specialties upon whose turf it trod (p 6).

2.

In 1950, Popper went to Harvard to deliver the prestigious William James lectures. During his time in the States he appears to have given a talk at the University of Chicago, where Strauss taught. Strauss told Voegelin that the talk "was very bad," "the most washed-out, lifeless positivism" (Emberly and Cooper 1993: 67), and inquired of his opinion of Popper. Voegelin replied with a vicious letter. He reports having reluctantly read Popper because so many people insist his *Open Society* is a masterpiece. His judgment is that the book is "impudent, dilettantish crap. Every single sentence is a scandal . . ." (ibid.). Noting that Popper takes the concept of open society from Bergson, he comments that Bergson did not develop it "for the sole purpose that the coffeehouse scum might have some-thing to botch." Voegelin

believed that Bergson would have thought that “Popper’s idea of the open society is ideological rubbish” (ibid.). Voegelin is only just getting started. He accuses Popper of “impertinent disregard for the achievements in this particular problem area [the history of political thought]” (Emberly and Cooper 1993: 68) and of being unable to reproduce accurately the ideas of Plato and Hegel. Popper is “a primitive ideological brawler.” Voegelin then strings more epithets together, “a failed intellectual,” “rascally impertinent, loutish; in terms of technical competence as a piece in the history of thought, it is dilettantish, and as a result is worthless” (Emberley and Cooper 1993: 67). The reader astonished at this undignified diatribe needs to remember that in the book in question Popper is vehement about the duty to think for oneself and not to defer to the authority of experts. Strauss and Voegelin agree on the opposite, and on the duty of the enlightened elite to defend standards. Strauss had said he was willing to keep Voegelin’s remarks to himself. Voegelin concludes: “It would not be suitable to show this letter to the unqualified. Where it concerns its factual contents, I would see it as a violation of the vocational duty you identified, to support this scandal through silence” (Emberly and Cooper 1993: 69). Following this invitation, Strauss showed the letter to Kurt Riezler, “who was thereby encouraged to throw his not inconsiderable influence into the balance against Popper’s probable appointment here [in the US]. You thereby helped to prevent a scandal.” With hindsight one might think that the scandal is that someone who had dared to challenge the traditional Germanic learning, the worship of the great men, the enemies of science and Enlightenment, is not met out in the open with argument, but is disposed of behind the scenes, as quietly as possible, by the self-righteous use of power.

3.

In Germany and Austria Popper’s vocabulary became standard in the attempt to build a philosophy for the democracies of those countries. Some German philosophers (but only some), and influential members of the intellectual and political class, took Popper’s ideas for common currency, showering him with public honor and recognition. Translations into all the main European languages ensured a wide currency for the ideas. It might be only a slight exaggeration to say that Popper is a philosophical icon for the European Union’s liberals. Equally important, though less obvious, was Popper’s impact in totalitarian areas of Europe, From Spain and Portugal, through Eastern Europe to the USSR and to China, his works were spread in translation and samizdat publication as a fulcrum of intellectual resistance to the official ideology. After the fall of the Eastern European empire of the USSR in 1989, there was much need to build free and democratic institutions, and to reintroduce notions of freedom of thought, critical thinking, and intellectual inquiry in the former Soviet bloc countries. Popper was one of the few Western philosophers whose ideas were of sufficient scope and depth to be applied to the task of linking free inquiry, free communication, freedom to enter and exit, with openness and freedom in politics. George Soros, the American billionaire of Hungarian origin who had encountered Popper’s ideas during studies at the LSE, set up a network of philanthropic institutions in the region - aptly called “Open Society Foundations” - to put into practice Popper’s ideas, by encouraging critical thinking in education, and by contributing to the development of an active, lively, civil society. In addition, Soros set up the Central European University (CEU) in Prague and then Budapest, to provide, among other things, an intellectual training ground for these ideas (p 8).

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The Structure of Scientific Revolutions by Thomas Kuhn was the most influential book on the nature of science in the second half of the 20th century – and arguably, the entire 20th century. Nevertheless, a reminder of the book’s contents immediately makes this fact rather

surprising. *Structure* purports to provide a general account of scientific change in 200 non-technical, lightly referenced pages, in the manner of an extended encyclopaedia entry, as the book was in fact originally conceived (Fuller 2003, pp18-19).

For Kuhn, science is simply good at solving its self-defined problems, whose purely technical nature led him to dub them 'puzzles'. But far from demoting the physical sciences, Kuhn was actually trying – as a latter-day Plato might – to insulate them from responsibility for real world effects, entanglement in which has historically prevented the social and biological science from taking full control of their inquiries (Fuller 2003, p69).

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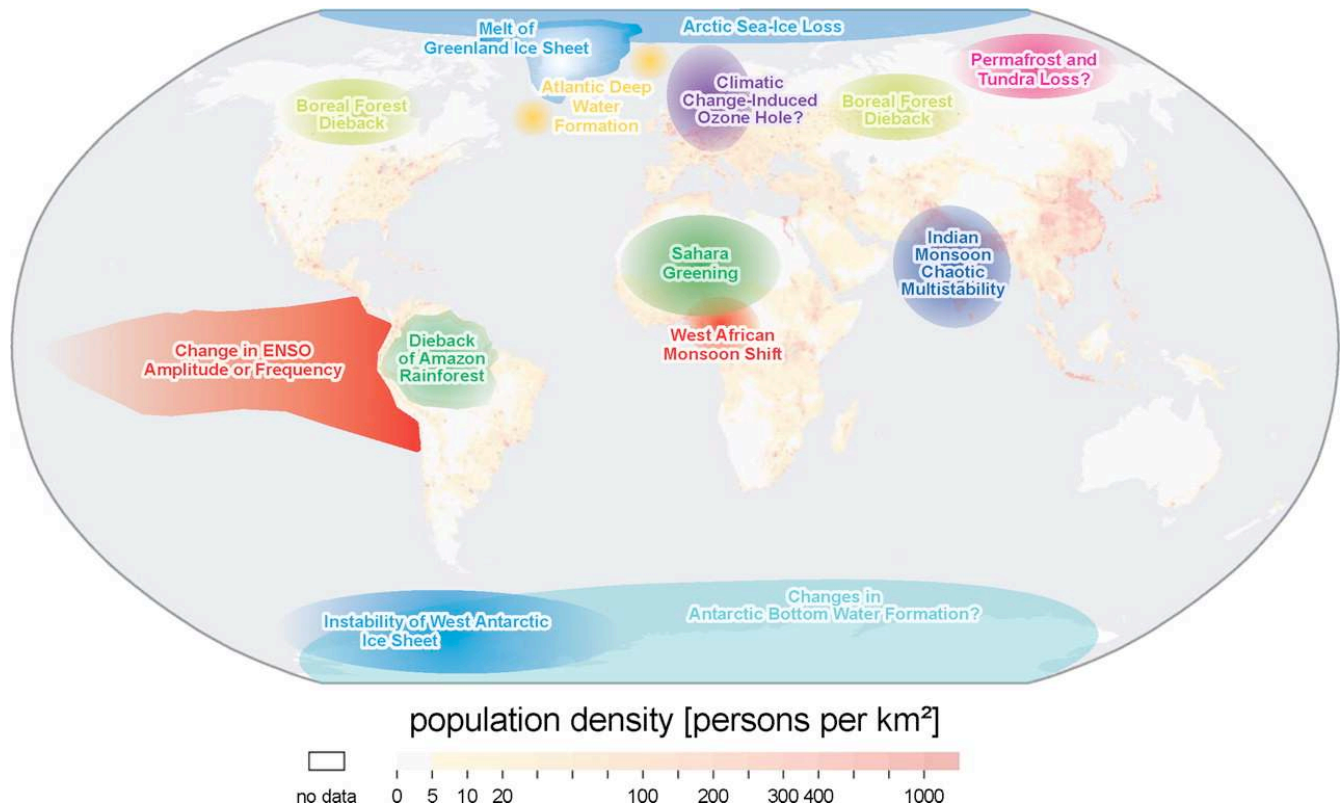
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Map: potential policy-relevant tipping elements in the climate system, ...and overlain on global population density. Subsystems indicated could exhibit threshold-type behavior in response to anthropogenic climate forcing, where a small perturbation at a critical point qualitatively alters the future fate of the system. They could be triggered this century and would undergo a qualitative change within this millennium. We exclude from the map systems in which any threshold appears inaccessible this century (e.g., East Antarctic Ice Sheet) or the qualitative change would appear beyond this millennium (e.g., marine methane hydrates). Question marks indicate systems whose status as tipping elements is particularly uncertain.

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Abstract: Will a group of people reach a collective target through individual contributions when everyone suffers individually if the target is missed? This “collective-risk social dilemma” exists in various social scenarios, the globally most challenging one being the prevention of dangerous climate change. Reaching the collective target requires individual sacrifice, with benefits to all but no guarantee that others will also contribute. It even seems tempting to contribute less and save money to induce others to contribute more, hence the dilemma and the risk of failure. Here, we introduce the collective-risk social dilemma and simulate it in a controlled experiment: Will a group of people reach a fixed target sum through successive monetary contributions, when they know they will lose all their remaining money with a certain probability if they fail to reach the target sum? We find that, under high risk of simulated dangerous climate change, half of the groups succeed in reaching the target sum, whereas the others only marginally fail. When the risk of loss is only as high as the necessary average investment or even lower, the groups generally fail to reach the target sum. We conclude that one possible strategy to relieve the collective-risk dilemma in high-risk situations is to convince people that failure to invest enough is very likely to cause grave financial loss to the individual. Our analysis describes the social window humankind has to prevent dangerous climate change.

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Abstract: Realism maintains that universal moral principles cannot be applied to the actions of states (...). The individual may say for himself: "Let justice be done, even if the world must perish", but the state has no right to say so in the name of those who are in its care. (...) While the individual has a moral right to sacrifice himself in defense of such a moral principle, the state has no right to let its moral disapprobation of the infringement of (that moral principle) get in the way of successful political action, itself inspired by the moral principle of national survival (p 166).

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Abstract: Although generally distinct from continental environments, and therefore of interest in their own right, island environments have been generally misunderstood, misinterpreted, and mismanaged. The main reason is that they have been interpreted for management purposes largely by continent-trained observers. An example of views towards island size is given. It is argued that the pejorative label 'small' should no longer be used to characterise islands. The ways in which island environments have been impacted by humans and their commensals is given. Questions of the sustainable development of island environments are also considered, including for whom these should be sustainable, how extraneous threats like sea-level rise are best incorporated into such plans, and what threats are posed to the rest of the world by mega-tsunami from certain island environments. Island environments are best managed by persons who understand their distinct character and who are committed to their future.

OED. (2007). *Insular*. *Oxford English Dictionary*.

[ad. L. *insular-is*, *f. insula* island; see

-AR¹. Cf. F. *insulaire*.]

A. *adj.*

1. a. Of or pertaining to an island; inhabiting or situated on an island. 1611 COTGR., *Insulaire*, Insular, Iland-like; of, or belonging to, an Iland. 1669 GALE *Crt. Gentiles I. II. vi. 73 In ancient times..they called every Insular Prince by the name of Neptune*. 1796 BURKE *Regic. Peace i. Wks. VIII. 151 The names and other..signs of approximation, rather augmented than diminished our insular feuds*. 1867 FREEMAN *Norm. Conq. I. ii. 29 The insular Teutons showed themselves the most zealous of missionaries*.

b. *Phys. Geog.* Of climate: Of the moderate or temperate kind which prevails in situations surrounded and tempered by the sea. 1830 LYELL *Princ. Geol. I. 97 An alteration from what has been termed an 'insular' to an 'excessive' climate*. 1880 HAUGHTON *Phys. Geog. iii. 118 The term 'Insular Climate' has been always given to climates in which the annual range of temperature is small*. 1885 R. H. SCOTT *Elem. Meteorol. 344 Hence comes the subdivision of climates into insular or moderate, and continental or excessive. The west coasts of continents enjoy insular..climates*.

2. *Of the nature of an island; composing or forming an island*. 1662 STILLINGFL. *Orig. Sacr. I. ii. §4 That the Tyre mentioned by Sanchoniathon was not the famous Insular Tyrus, but some other Tyre*. 1830 LYELL *Princ. Geol. I. 228 The alleged exposure of certain insular rocks in the Bothnian and other bays*. 1879 D. M. WALLACE *Australas. i. 1 A description of the great insular landAustralia*.

3. a. *transf.* Detached or standing out by itself like an island; insulated.

b. *Bot.* 'Situated alone, applied to galls which occur singly on a leaf' (*Cent. Dict.* 1890).

c. *Path.* *insular sclerosis*. 'Moxon's term for Sclerosis, disseminated' (*Syd. Soc. Lex.* 1886).

d. *Anat.* (see quot. 1886). 1886 *Syd. Soc. Lex.*, *Insular*, relating to an *Insula*, or to the Island of Reil. 1891 *Lancet* 3 Oct. 780 *We are inclined to think that the evidence of insular sclerosis is not quite convincing*. 1897 *Allbutt's Syst. Med. II. 932 In insular sclerosis the tremor is completely absent during rest*.

4. a. *Pertaining to islanders; esp. having the characteristic traits of the inhabitants of an island (e.g. of Great Britain); cut off from intercourse with other nations, isolated; self-contained; narrow or prejudiced in feelings, ideas, or manners*. 1775 JOHNSON *Journ. West. Isl., Coriatachan, The relief given to the mind in the penury of insular conversation by a new topick*. 1829 LYTTON *Disowned xxxv, Percy Bobus, with true insular breeding, took up the newspaper*. 1847 JAMES J. *Marston Hall ix, My English accent, and my insular notions, as he called them*. 1849 MACAULAY *Hist. Eng. ix. II. 427 They were a race insular in temper as well as in geographical position*. 1856 MRS. BROWNING *Aur. Leigh VI. 1 The English have a scornful insular way Of calling the French light*. 1870 LOWELL *Study Wind. 252 Without ceasing to be English, he has escaped from being insular*. 1890 BOLDREWOOD *Col. Reformer (1891) 136, I am not sufficiently insular to deny a foreign nobility all the graces and virtues that add lustre to our own*.

b. *Palaeogr.* (See quotes.) 1908 W. M. LINDSAY *Contractions in Early Latin Minuscule MSS. 1 The most fertile source of error..is the unfamiliarity of the writers with the contractions used in the Irish or pre-Carolingian script... The correct term is Insular, for English MSS. are included and Welsh too*. 1913 F. W. HALL *Compan. Classical Texts 167 Insular hands. i.e. Irish and Anglo-Saxon; a peculiar type of the half-uncial developed in the sixth century*. 1960 G. A. GLAISTER *Gloss. Bk. 195/1 Insular hand, the name given to the Hiberno-Saxon script widely used in England until the Norman Conquest for non-Latin texts. Its origins may be traced to 6th-century Ireland. An example is the first London Charter, 1066, which may be*

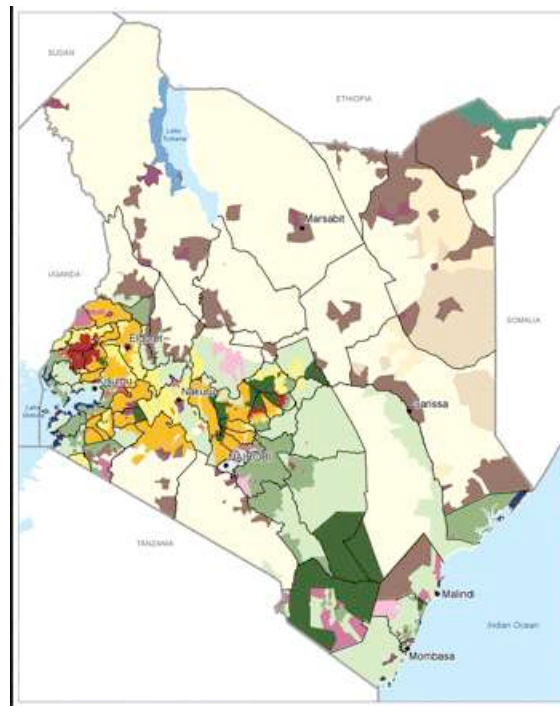
seen in the Guildhall Library. 1960 E. A. LOWE Eng. *Uncial 14 By Insular symptoms we mean features and practices peculiar to Anglo-Saxon (and Irish) scribes.* 1971 T. A. M. BISHOP Eng. *Caroline Minuscule p. xiii, The most extensive repertoires of Insular abbreviations in Caroline minuscule are MSS. of probably Continental origin.*

B. n. An inhabitant of an island; an islander. 1744 BERKELEY *Siris* §109 *It is much to be lamented that our insulars..grow stupid or dote sooner than other people.* 1845 in J. Pye *Patron. Brit. Art v.* 206 *Generous insulars of our country.* 1886 *Longm. Mag. VII.* 517 *A nimbleness foreign to us phlegmatic, deliberate insulars.*

OED. (1997). *Skepticism, scepticism.* *Oxford English Dictionary.*

A seeker of truth. One who, like Pyrrho and his followers in Greek antiquity..., one who holds that there are no adequate grounds for certainty as to the truth of any proposition... Those who deny the competence of reason, or the existence of a justification for certitude, outside the limits of experience. The difference between the two usages becomes clearer when considering 'sceptic's' Latin origin (scepticus): inquiring, reflective, assumed by the disciples of Phyrrho as their distinctive epithet... to look out.

Okwi, P.O., Ndeng'e, G., Kristjanson, P., Arunga, M., Notenbaert, A., Omolo, A., Henninger, N., Benson, T., Kariuki, P., & Owuor, J. (2007). Spatial determinants of poverty in rural Kenya. Published online on October 17, 2007. Edited by Partha Sarathi Dasgupta, University of Cambridge, Cambridge, United Kingdom, and accepted August 6, 2007 (received for review February 6, 2007). PNAS | October 23, 2007 | vol. 104 | no. 43 | 16769-16774.



Map: Economic map of Kenya. Poverty is not uniform across the country but depends on a host of geographic factors such as soil type and elevation. Okwi *et al.* analyze the effect of Kenyan geography on income.

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Plato. (c. 360 B.C.). *The Republic.* (J. Adam Trans.). (2nd ed.). Cambridge, UK: At the University Press.

1.

“Lies are necessary, Plato asserts, ‘if your herd is to reach highest perfection’ ; for this needs ‘arrangements that must be kept secret from all butt the rulers, if we wish to keep the herd of guardians really free from disunion’. Furthermore, Plato “decrees that the rulers should

fabricate, for the purpose of mating the young auxiliaries, 'an ingenious system of balloting, so that the persons who have been disappointed .. may blame their bad luck, and not the rulers', who are, secretly, to engineer the ballot" (Popper 1945, Vol. II., p 150).

2.

"Aristotle's thought is entirely dominated by Plato's. Somewhat grudgingly, he followed his great teacher as closely as his temperament permitted, not only in his general political outlook but practically everywhere. So he endorsed, and systematized, Plato's naturalistic theory of slavery : 'Some men are by nature free, and others slaves and for the later, slavery is fitting as well as just... A man who is by nature not his own, but another's, is by nature a slave... Hellenes do not like to call themselves slaves, but confine this term to barbarians... The slave is totally devoid of any faculty of reasoning', while free women have just a very little of it. (We owe to Aristotle's criticisms and denunciations most of our knowledge of the Athenian movement against slavery. By arguing against the fighters for freedom, he preserved some of their utterances.)" (Ibid p 3).

Polanyi, K. (1944) *The great transformation*. New York/Toronto: Rinehart & Company Inc.

Popper, K. R. (1999). *All life is problem solving* [Alles Leben ist Problemlösen.] . London ; New York: Routledge.

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1.

open societies, closed societies:

These terms were introduced by Karl Popper in his book *The Open Society and its Enemies* (1945), and further explored in *The Poverty of Historicism* (1957). Popper argued that both science and human history are essentially indeterminate and fluid. Applied to social theory, this produced Popper's lively and devastating attack on historicism. Theories such as those of Plato, Hegel, and Marx, which proposed the existence of laws of history and a knowable human destiny, were dismissed by Popper as scientifically insupportable and politically dangerous. He proposed that all such theories would lead to authoritarian and inhumane regimes, which he called closed societies because they were closed to the normal processes of change. Open societies by contrast were based on the activity, creativity, and innovation of many individuals, and would develop unpredictably through piecemeal social engineering. They are those societies in which social policies are monitored for unintended consequences, openly criticized, and altered in the light of such criticism. Such societies must be both liberal and democratic, in the sense that it must be possible to remove from office rulers who fail to respond to justified criticism.¹

2.

For the Open Society (about 430 B.C.):

Although only a few may originate a policy, we are all able to judge it.

PERICLES OF ATHENS

Against the Open Society (about 80 years later):

The greatest principle of all is that nobody, whether male or female, should be without a leader. Nor should the mind of anybody be habituated to letting him do anything at all on his own initiative ; neither out of zeal, nor even playfully. But in war and in the midst of peace—to his leader he shall direct his eye and follow him faithfully. And even in the smallest matter he should stand under leadership. For example, he should get up, or move, or wash, or take his meals... only if he has been told to do so. In

a word, he should teach his soul, by long habit, never to dream of acting independently, and to become utterly incapable of it.

PLATO OF ATHENS

(Popper 1945, Vol. I, p 7)

3.

The development of thought since Aristotle could, I think, be summed up by saying that every discipline, as long as it used the Aristotelian method of definition, has remained arrested in a state of empty verbiage and barren scholasticism, and that the degree to which the various sciences have been able to make any progress depended on the degree to which they have been able to get rid of this essentialist method. (this is why so much of our 'social science' still belongs to the Middle Ages.) This discussion of this method will have to be a little abstract, owing to the fact that the problem has been so thoroughly muddled by Plato and Aristotle, whose influence has given rise to such deep-rooted prejudices that the prospect of dispelling them does not seem very bright. (Popper 1945, Vol. II, p 9).

4.

see Soros (2006)

1"open societies and closed societies" A Dictionary of Sociology. John Scott and Gordon Marshall. Oxford University Press 2005. Oxford Reference Online. Oxford University Press.

- - - . (1956). *ON THE NON-EXISTENCE OF SCIENTIFIC METHOD*. (preface from 1956 edition, Vol. I of the Postscript to 1983 edition of *The Logic of Scientific Discovery* edited by W. W. Bartley III ed.,). London: Routledge.
- - - . (1962). *Conjectures and refutations : The growth of scientific knowledge* (First Edition Preface from the 1963 Routledge edition ed.).
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1.

Men, animals, plants, even unicellular organisms are constantly active. They are trying to improve their situation, or at least to avoid its deterioration. Even when asleep, the organism is actively maintaining the state of sleep: the depth (or else the shallowness) of sleep is a condition actively created by the organism, which sustains sleep (or else keeps the organism on the alert). Every organism is constantly preoccupied with the task of solving problems. These problems arise from its own assessments of its condition and of its environment; conditions which the organism seeks to improve.

An attempted solution often proves to be misguided, in that it makes things worse. Then follow further attempts at solution – further trial and error movements.

We can see that life—even at the level of the unicellular organism—brings something completely new into the world, something that did not previously exist: problems and active attempts to solve them; assessments, values: trial and error.

It may be supposed that, under the influence of Darwin's natural selection, it is the most active problem solvers, the seekers and the finders, the discoverers of new worlds and new forms of life, that undergo the greatest development.

Each organism also strives to stabilize its internal conditions of life and to maintain its individuality – an activity whose results biologists call 'homeostasis'. Yet this too is an internal agitation, an internal activity: an activity that attempts to restrict the internal agitation, a feedback mechanism, a correction of errors. The homeostasis must be incomplete. It must restrict itself. Were it completely successful, it would mean the death of the organism, or, at the very least, the temporary cessation of all its vital functions. Activity, agitation, search are essential for life, for perpetual restlessness, perpetual imperfection; for perpetual seeking, hoping, evaluation, finding, discovering, improving, for learning and for the creation of values; but also for perpetual error...

Darwinism teaches that organisms become adapted to the environment through natural selection. And it teaches that they are passive throughout this process. But it seems to me far more important to stress that the organisms find, invent and reorganize new environments in the course of their search for a better world...

All organisms are fully occupied with problem-solving. *Their first problem is survival*. But there are countless concrete problems that arise in the most diverse situations. And one of the most important problems is the search for better living conditions: for greater freedom; for a better world.

According to this optimistic interpretation, it is through natural selection and (we may suppose) through an external selection pressure that a strong internal selection pressure comes into being at a very early stage; a selection pressure exerted by the organisms upon their environment. This selection pressure manifests itself as a kind of behavior that we may interpret as searching for a new ecological niche. Sometimes it is even the construction of a new ecological niche.

This pressure from within results in a choice of niches; that is, in forms of behavior that may be regarded as a choice of lifestyles and of surrounding. This must be taken to include choice of friends, symbiosis, and above all, perhaps most importantly... the choice of a mate... [All italics mine, Popper 1992].

- - - . (1999). *All life is problem solving* [Alles Leben ist Problemlösen.] . London ; New York: Routledge.
- - - . (1956). *Realism and the aim of science* (1983, including Popper's introduction from the 1982 edition and Popper's preface from 1956 edition ed.). London: Routledge.
- - - . (1957). *The poverty of historicism* (2nd, 2002 ed.). London: Routledge. <http://site.ebrary.com.rproxy.upei.ca/lib/yale/Doc?id=5006152>
- - - . (1959). *The Logic of Scientific Discovery* [Logik der Forschung, 1935, Vienna, Austria] . London ; New York: Routledge.

1.

The initial stage, the act of conceiving or inventing a theory, seems to me neither to call for logical analysis nor to be susceptible of it. The question how it happens that a new idea occurs to a man—whether it is a musical theme, a dramatic conflict, or a scientific theory—may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge. This latter is concerned not with questions of fact (Kant's *quid facti?*), but only with questions of justification or validity (Kant's *quid juris?*). Its questions are of the following kind. Can a statement be justified? And if so, how? Is it testable? Is it logically dependent on certain other statements? Or does it perhaps contradict them? In order that a statement may be logically examined in this way, it must already have been presented to us. Someone must have formulated it, and submitted it to logical examination.

Accordingly I shall distinguish sharply between the process of conceiving a new idea, and the methods and results of examining it logically. As to the task of the logic of knowledge—in contradistinction to the psychology of knowledge—I shall proceed on the assumption that it consists solely in investigating the methods employed in those systematic tests to which every new idea must be subjected if it is to be seriously entertained.

Some might object that it would be more to the purpose to regard it as the business of epistemology to produce what has been called a ‘rational reconstruction’ of the steps that have led the scientist to a discovery—to the finding of some new truth. But the question is: what, precisely, do we want to reconstruct? If it is the processes involved in the stimulation and release of an inspiration which are to be reconstructed, then I should refuse to take it as the task of the logic of knowledge. Such processes are the concern of empirical psychology but hardly of logic. It is another matter if we want to reconstruct rationally the subsequent tests whereby the inspiration may be discovered to be a discovery, or become known to be knowledge. In so far as the scientist critically judges, alters, or rejects his own inspiration we may, if we like, regard the methodological analysis undertaken here as a kind of ‘rational reconstruction’ of the corresponding thought processes. But this reconstruction would not describe these processes as they actually happen: it can give only a logical skeleton of the procedure of testing. Still, this is perhaps all that is meant by those who speak of a ‘rational reconstruction’ of the ways in which we gain knowledge.

It so happens that my arguments in this book are quite independent of this problem. However, my view of the matter, for what it is worth, is that there is no such thing as a logical method of having new ideas, or a logical reconstruction of this process. My view may be expressed by saying that every discovery contains ‘an irrational element’, or ‘a creative intuition’, in Bergson’s sense. In a similar way Einstein speaks of the ‘search for those highly universal laws . . . from which a picture of the world can be obtained by pure deduction. There is no logical path’, he says, ‘leading to these . . . laws. They can only be reached by intuition, based upon something like an intellectual love (‘Einfühlung’) of the objects of experience.’ (Popper 1959, pp 7-9)

2.

- (a) The method of the social sciences, like that of the natural sciences, consists in trying out tentative solutions to those problems from which our investigations start. Solutions are proposed and criticized. If a proposed solution is not open to objective criticism, then it is excluded as unscientific, although perhaps only temporarily.
- (b) If the proposed solution is open to objective criticism, then we attempt to refute it; for all criticism consists in attempts at refutation.
- (c) If a proposed solution is refuted through our criticism we propose another solution.
- (d) If it withstands criticism, we accept it temporarily; and we accept it, above all, as worthy of further discussion and criticism.
- (e) Thus the method of science is one of the tentative attempts (or brain-waves) to solve our problems which are controlled by the most severe criticism. It is a critical development of the method of ‘trial and error’.
- (f) The so-called objectivity of science lies in the objectivity of the critical method; that is, above all, in the fact that no theory is exempt from criticism, and further, in the fact that the logical instrument of criticism – the logical contradiction – is objective (Popper 1992, pp. 66-67).

3.

It is often difficult enough for the expert, and certainly in many instances impossible for the layman, to distinguish between legitimate and illegitimate claims advanced in the name of science. . . . If we are to safeguard the reputation of science, and to prevent the arrogation of knowledge based on a superficial similarity of procedure with that of the physical sciences, much effort will have to be directed toward debunking such arrogations, some of which have by now become the vested interests of established university departments. We cannot be grateful enough to such modern philosophers of science as Sir Karl Popper for giving us a test by which we can distinguish between what we may accept as scientific and what not - a test which I am sure some doctrines now widely accepted as scientific would not pass (Nobel 1974).

4.

Emile Zola described a work of art as a corner of nature seen through a temperament. The philosopher Karl Popper, the economist F.A. Hayek, and the art historian K. H. Gombrich have shown that the creative process in science and art consists of two main activities: an imaginative jumping forward to a new abstraction or simplified representation, followed by a critical looking back to see how nature appears in the light of the new vision (Nobel 1978).

5.

The New Zealand interlude was. . . notable because there Eccles met the philosopher, Karl Popper, from whom he learnt the relationship of the scientist to hypotheses; how to be daring in developing hypotheses of the greatest generality, and at the same time how to test them with the utmost rigour with the consequence either of falsification in whole or in part, or at best corroboration; but never confirmation. *He feels that this relationship to hypotheses has not only increased his conceptual power, but has also greatly helped emotionally! He can now rejoice even in the falsification of a cherished theory, because even this is a scientific success* [italics mine] (Nobel 1963).

5.

My characteristics as a scientist stem from a non-conformist upbringing, a sense of being something of an outsider, and looking for different perceptions in everything from novels, to art to experimental results. I like complexity, and am delighted by the unexpected. Ideas interest me. I was influenced early on by reading Arthur Koestler and Edward de Bono, and more recently by the writings of Karl Popper. . . (Nobel 1996).

6.

Popper believed the “discovery was not a matter of logic” but rather the application of methodology, which fits the discovery of cointegration. This insight intrigues me... (Nobel 2003).

--- (1962). *Conjectures and refutations : the growth of scientific knowledge* (First Edition Preface from the 1963 Routledge edition ed.).

Abstract: The essays and lectures of which this book is composed are variations upon one very simple theme--the thesis that we can learn from our mistakes. They develop a theory of knowledge and of its growth. It is a theory of reason that assigns to rational arguments the modest and yet important role of criticizing our often mistaken attempts to solve our problems... Though it stresses our fallibility it does not resign itself to skepticism, for it also stresses the fact that knowledge can grow, and that science can progress - just because we can learn from our mistakes (xi)

--- (1963). *Conjectures and refutations : the growth of scientific knowledge* (Originally published: 5th ed., rev. London ; New York : 2002. ed.). London ; New York: Routledge Classics.

Abstract: This problem had been seen and solved long before; first, it appears, by Xenophanes, and then by Democritus, and by Socrates... The solution lies in the realization that all of us may and often do err, singly and collectively, but that this very idea of error and human fallibility involves another one--the idea of objective truth: the standard which we may fall short of. Thus the doctrine of fallibility should not be regarded as part of a pessimistic epistemology. This doctrine implies that we may seek for truth, for objective truth, though more often than not we may miss it by a wide margin. And it implies that if we respect truth, we must search for it by persistently searching for our errors: by indefatigable rational criticism, and self-criticism (p 21).

--- (1992). *In search of a better world* [Auf der Suche nach einer besseren Welt.] (Laura J. Bennett, with additional material by Melitta Mew Trans.). London ; New York: Routledge.

1.

(i) The method of the social sciences, like that of the natural sciences, consists in trying out tentative solutions to those problems from which our investigations start. Solutions are proposed and criticized. If a proposed solution is not open to objective criticism, then it is excluded as unscientific, although perhaps only temporarily.

(ii) If the proposed solution is open to objective criticism, then we attempt to refute it; for all criticism consists in attempts at refutation.

(iii) If a proposed solution is refuted through our criticism we propose another solution.

(iv) If it withstands criticism, we accept it temporarily; and we accept it, above all, as worthy of further discussion and criticism.

(v) Thus the method of science is one of the tentative attempts (or brain-waves) to solve our problems which are controlled by the most severe criticism. It is a critical development of the method of ‘trial and error’.

(vi) The so-called objectivity of science lies in the objectivity of the critical method; that is, above all, in the fact that no theory is exempt from criticism, and further, in the fact that the logical instrument of criticism – the logical contradiction – is objective (pp 66-67).

Popper, K. R., & Bartley, W. W. (1956). *Realism and the aim of science* (1983, including Popper's introduction from the 1982 edition and Popper's preface from 1956 edition ed.). London: Routledge.

Proops, J. L. R., Faber, M., Manstetten, R., & Jöst, F. (1996). Achieving a sustainable world. *Ecological Economics*, 17(3), 133-135.

Ramaekers, S. (2006). No Harm Done: The Implications for Educational Research of the Rejection of Truth. *Journal of Philosophy of Education*, 40(2), 241-257.

Abstract: In much educational theory there is concern about claims that the concept of truth has no place anymore in educational thinking. These claims are generally identified as 'postmodernist' or 'poststructuralist'. The fear is that when abandoning the quest for truth we enter the domain of mere belief, and in this way leave education without firm grounds. In this article I examine some examples of what is often crudely lumped together as 'postmodernist' educational research. What is at stake here, I argue, is not so much a rejection of the quest for truth as rather a shift of focus to a different set of questions and interests: for example, existential questions. Against the contemporary, dominant focus on evidence-based practice, which conceals the person behind the method (textbook, rules, techniques), here the embodied person with her individual investment in education is brought into the light again.

Rampino, M. R. (2002). Supereruptions as a Threat to Civilizations on Earth-like Planets. *Icarus*, 156(2), 562-569.

Abstract: The largest explosive volcanic eruptions (supereruptions) produce >1000 km³ of ejected material and ≥1000 Mt (10¹⁵ g) of submicron atmospheric aerosols and dust. These eruptions may be capable of creating global climatic disturbances sufficient to cause severe problems for world agriculture and modern civilization. Supereruptions are estimated to occur on average about every 50,000 years, which is about twice the frequency of impacts by comets and asteroids ≥1 km diameter predicted to cause similar climatic effects. Prediction, prevention, and mitigation of global volcanic climatic disasters may be potentially more difficult than planetary protection from the threat of large impacts, so that explosive volcanism might limit the longevity of technological civilizations.

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- Abstract:** Whether educational research should employ the 'scientific method' has been a recurring issue in its history. Hence, textbooks on research methods continue to perpetuate the idea that research students ought to choose between competing camps: 'positivist' or 'interpretivist'. In reference to one of the most widely referred to educational research methods textbooks on the market-namely *Research Methods in Education* by Cohen, Manion, and Morrison-this paper demonstrates (1) the misconception of science in operation and (2) the perversely false dichotomy that has become enshrined in educational research. It then advocates a new approach, and suggests that the fixation with 'science' versus 'non-science' is counterproductive, when what is actually required for good inquiry is a critical approach to knowledge claims.
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Most people...complain about the meanness of nature, because we are born for a brief span of life, and because this spell of time that has been given to us rushes by so swiftly and rapidly that with very few exceptions life ceases for the rest of us just when we are getting ready for it. Nor is it just the man in the street and the unthinking mass of people who groan over this - as they see it - universal evil: the same feeling lies behind complaints from even distinguished men. Hence the dictum of the greatest of doctors: 'Life is short, art is long.' Hence too the grievance, most improper to a wise man, which Aristotle expressed when he was taking nature to task for indulging animals with such long existences that they can live through five or ten human lifetimes, while a far shorter limit is set for men who are born to a great and extensive destiny. *It is not that we have a short time to live, but that we waste a lot of it. Life is long enough, and a sufficiently generous amount has been given to us for the highest achievements if it were all well invested* [italics mine]. But when it is wasted in heedless luxury and spent on no good activity, we are forced at last by death's final constraint to realize that it has passed away before we knew it was passing. So it is: we are not given a short life but we make it short, and we are not ill-supplied but wasteful of it. Just as when ample and princely wealth falls to a bad owner it is squandered in a moment, but wealth however modest, if entrusted to a good custodian, increases with use, so our lifetime extends amply if you manage it properly.

Why do we complain about nature? She has acted kindly: *life is long if you know how to use it* [italics mine]. But one man is gripped by insatiable greed, another by a laborious dedication to useless tasks. One man is soaked in wine, another sluggish with idleness. One man is worn out by political ambition, which is always at the mercy of the judgment of others. Another through hope of profit is driven headlong over all lands and seas by the greed of trading. Some are tormented by a passion for army life, always intent on inflicting dangers on others or anxious about danger to themselves. Some are worn out by the self-imposed servitude of thankless attendance on the great. Many are occupied by either pursuing other people's money or complaining about their own. Many pursue no fixed goal, but are tossed about in ever-changing designs by a fickleness which is shifting, inconstant and never satisfied with itself. Some have no aims at all for their life's course, but death takes them unawares as they yawn languidly - so much so that I cannot doubt the truth of that oracular remark of the greatest poet: 'It is a small part of life we really live.' (pp 1-2).

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Abstract: My goal is to defend what one might call a scientific *worldview* -- defined broadly as a respect for evidence and logic, and for the incessant confrontation of theories with the real world; in short, for reasoned argument over wishful thinking, superstition and demagoguery. And my motives for trying to defend these old-fashioned ideas are basically *political*. I'm worried about trends in the American Left -- particularly here in academia -- that at a minimum *divert* us from the task of formulating a progressive social critique, by leading smart and committed people into trendy but ultimately empty intellectual fashions, and that can in fact *undermine* the prospects for such a critique, by promoting subjectivist and relativist philosophies that in my view are inconsistent with producing a realistic analysis of society that we and our fellow citizens will find compelling.

David Whiteis, in a recent article, said it well:

Too many academics, secure in their ivory towers and insulated from the real-world consequences of the ideas they espouse, seem blind to the fact that non-rationality has historically been among the most powerful weapons in the ideological arsenals of oppressors. The hypersubjectivity that characterizes postmodernism is a perfect case in point: far from being a legacy of leftist iconoclasm, as some of its advocates so disingenuously claim, it in fact ... plays perfectly into the anti-rationalist -- really, anti-*thinking* -- bias that currently infects "mainstream" U.S. culture.

Now of course, no one will admit to being against reason, evidence and logic -- that's like being against Motherhood and Apple Pie. Rather, our postmodernist and poststructuralist friends will claim to be in favor of some new and *deeper* kind of reason, such as the celebration of "local knowledges" and "alternative ways of knowing" as an antidote to the so-called "Eurocentric scientific methodology" (you know, things like systematic experiment, controls, replication, and so forth).

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Srebrnik, H. (2004). Small Island Nations and Democratic Values. *World Development*, 32(2), 329-341.

Abstract: When it comes to the practice of democratic politics, do size and insularity matter? A number of studies suggest that small island states are more likely to be democratic than others, regardless of levels of economic development. The Commonwealth islands, especially, have done very well on indices of political and civil rights and have provided the basis for vibrant civil societies. But this research also indicates that in other instances, rigid control exercised by elites may result in nepotism and patronage. As well, "islandness" has proved little protection against severe ethno-cultural cleavages and, in small archipelagos, to secessionist movements.

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Abstract: The lecture focuses on the reasons that new ideas are accepted or rejected by a science. A distinction is drawn between pre-scientific and scientific stages of a discipline. The diverse fates of new ideas are illustrated by a variety of episodes in the history of economics, including the economics of information and the theory of economic regulation.
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Abstract: The Earth has a long and violent history of collisions with extraterrestrial bodies such as asteroids and comet nuclei. Several of these impacts have been large enough to produce major environmental changes, causing mass extinctions and severe alterations to weather patterns and geography. There is no reason to suppose that the likelihood of such collisions will be any less in the future and the spread of human settlement, civilisation, and particularly urbanisation, makes it much more likely that a future impact, even relatively small, could result in the massive loss of human life and property. Despite the fact that the technology exists to predict and to some extent prevent such events, there is currently no co-ordinated international response to this threat. This article presents a realistic assessment of the threat to Earth from NEOs, describes the (underfunded) efforts so far made to counter it and makes a plea for further action to produce a fully functioning Spaceguard Foundation.
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Abstract: While differential equations have been commonly used to model the population dynamics of biological systems, it is uncommon for such models to include the evolutionary potential of the species being modeled. As a consequence, the focus of such models has generally been directed toward ecological stability rather than on evolutionary stability. Here, an evolutionary game approach to modeling is

presented that allows for a very clear distinction between ecological and evolutionary stability. Necessary conditions are given for each type of stability so that they may be studied separately. In order to include evolution into management models, we are faced with two fundamental questions: what is evolving, and where is it evolving to? In the evolutionary game theory presented here, the ‘what’ are parameters in the differential game model associated with characteristics of the species that are clearly adaptive (such as sunlight conversion efficiency for plants or body length in animals), which we call strategies. The ‘where’ is the evolutionarily stable strategies (ESS) to which these parameters can evolve. These strategies can be determined using the ESS maximum principle presented here. The ESS maximum principle when used with appropriate models, has the capacity to predict the evolutionary response of biological systems subject to a wide range of inputs, including physiographic changes, harvesting, and the introduction or removal of new species and/or resources. Applications are discussed in terms of some typical managed ecosystems. A detailed example, illustrating use of the theory, is given in which the treatment of cancer with drugs is ‘simulated’.

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- Abstract:** Genetic recombination is a central and repeated topic of study in the evolution of life. However, along with the influence of recombination on evolution, we understand surprisingly little of how selection shapes the nature of recombination. One explanation for recombination is that it allows organisms to escape from perilous situations where they experience very low fitness. As a corollary, it has been suggested that selection should favor recombination at low fitness and not at high fitness (fitness-associated recombination, FAR), and theory suggests that such strategies can indeed be selected. Here we develop models to further investigate the evolution of FAR. Consistent with previous works, we find that FAR can invade and dominate over a strategy of uniform recombination that is independent of fitness. However, our simulation results suggest that extreme FAR strategies, known as group-elitism, are not necessarily superior to other FAR strategies. Moreover, we argue that FAR domination will often occur with a net loss of mean population fitness. Interestingly, this suggests that the strategy of not recombining at high fitness will sometimes be analogous to a defector strategy from the famous “prisoner's dilemma” game: a selfish strategy that is selected but leads to a loss of mean fitness for all players.
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Yasuhara, M., Cronin, T.M., deMenocal, P.B., Okahashi, H., & Linsley, B.K. (2008). Abrupt climate change and collapse of deep-sea ecosystems. Published online on January 28, 2008, 10.1073/pnas.0705486105. Edited by James P. Kennett, University of California, Santa Barbara, CA, and approved December 12, 2007 (received for review June 13, 2007). PNAS | February 5, 2008 | vol. 105 | no. 5 | 1556-1560.

Abstract: We investigated the deep-sea fossil record of benthic ostracodes during periods of rapid climate and oceanographic change over the past 20,000 years in a core from intermediate depth in the northwestern Atlantic. Results show that deep-sea benthic community "collapses" occur with faunal turnover of up to 50% during major climatically driven oceanographic changes. Species diversity as measured by the Shannon–Wiener index falls from 3 to as low as 1.6 during these events. Major disruptions in the benthic communities commenced with Heinrich Event 1, the Inter-Allerød Cold Period (IACP: 13.1 ka), the Younger Dryas (YD: 12.9–11.5 ka), and several Holocene Bond events when changes in deep-water circulation occurred. The largest collapse is associated with the YD/IACP and is characterized by an abrupt two-step decrease in both the upper North Atlantic Deep Water assemblage and species diversity at 13.1 ka and at 12.2 ka. The ostracode fauna at this site did not fully recover until approximately 8 ka, with the establishment of Labrador Sea Water ventilation. Ecologically opportunistic slope species prospered during this community collapse. Other abrupt community collapses during the past 20 ka generally correspond to millennial climate events. These results indicate that deep-sea ecosystems are not immune to the effects of rapid climate changes occurring over centuries or less.

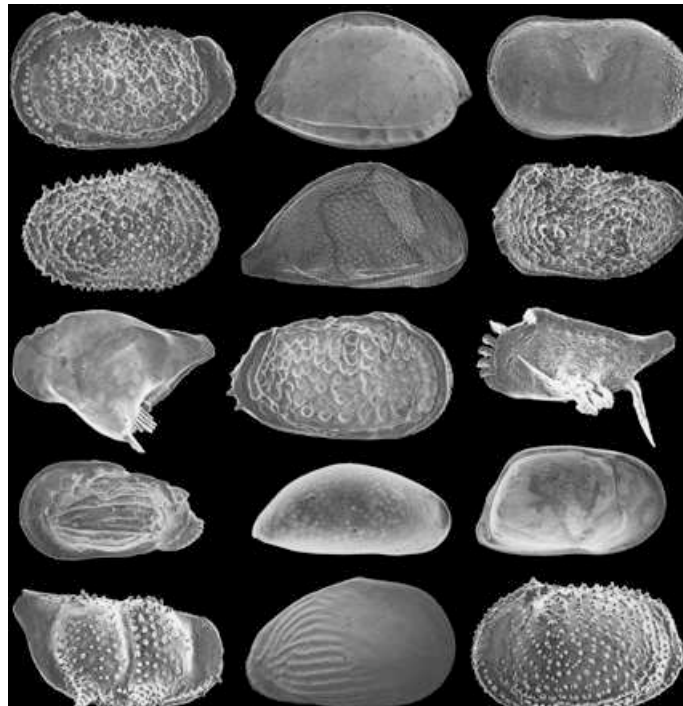


Photo: Ostracodes, which are small, clam-shaped crustaceans, have a rich fossil record unlike most deep-sea animals and are an important “window” into the ancient history of benthic ecosystems. The various shapes indicate high biodiversity. Yasuhara *et al.* show that deep-sea biodiversity is linked to global climate and has collapsed repeatedly over the past 20,000 years.

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Bertrand Arthur William Russell (b.1872 - d.1970) was a British philosopher, logician, essayist, and social critic, best known for his work in mathematical logic and analytic philosophy. His most influential contributions include his defense of logicism (the view that mathematics is in some important sense reducible to logic), and his theories of definite descriptions and logical atomism. Along with G.E. Moore, Russell is

generally recognized as one of the founders of analytic philosophy. Along with Kurt Gödel, he is also regularly credited with being one of the two most important logicians of the twentieth century.

Over the course of his long career, Russell made significant contributions, not just to logic and philosophy, but to a broad range of other subjects including education, history, political theory and religious studies. In addition, many of his writings on a wide variety of topics in both the sciences and the humanities have influenced generations of general readers. After a life marked by controversy (including dismissals from both Trinity College, Cambridge, and City College, New York), Russell was awarded the Order of Merit in 1949 and the Nobel Prize for Literature in 1950. Also noted for his many spirited anti-war and anti-nuclear protests, Russell remained a prominent public figure until his death at the age of 97.

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Karl Popper is generally regarded as one of the greatest philosophers of science of the 20th century. He was also a social and political philosopher of considerable stature, a self-professed 'critical-rationalist', a dedicated opponent of all forms of scepticism, conventionalism, and relativism in science and in human affairs generally, a committed advocate and staunch defender of the 'Open Society', and an implacable critic of totalitarianism in all of its forms. One of the many remarkable features of Popper's thought is the scope of his intellectual influence. In the modern technological and highly-specialised world scientists are rarely aware of the work of philosophers; it is virtually unprecedented to find them queuing up, as they have done in Popper's case, to testify to the enormously practical beneficial impact which that philosophical work has had upon their own.