

Nowak is (or was) a respected Harvard professor of mathematical biology with numerous well regarded publications. Sadly, he has chosen to launch an arrogant attack on science motivated by religious fervor. His recent actions show the evil consequences when universities accept money from religious groups, science journals are so awed by big names that they avoid proper peer review, and egos are permitted to get out of control. Most of this book is good, but it repeats the utterly misconceived attacks on inclusive fitness in favor of group selection which he and his much more famous Harvard colleague E.O.Wilson have been making the last 5 years, so it is on that chapter of the book that I will concentrate. This takes us into the nature of evolution, the basics of scientific methodology, how math relates to science, what constitutes a law or a theory, and what attitudes to religion and generosity are appropriate as we inexorably approach the collapse of industrial civilization.

Their attack on evolution (though presumably they don't see it that way and Nowak's religious views are not shared by Wilson) came into general awareness in 2010 with the publication of a now infamous paper in nature which was almost universally rejected by over 140 biologists who responded with letters and many papers since have shown in detail why it is mistaken. Wilson and Nowak have not responded in any meaningful way in 5 years of articles, lectures and several books. There is no choice but to agree with Dawkin's trenchant comment "For Wilson not to acknowledge that he speaks for himself against the great majority of his professional colleagues is--it pains me to say this of a lifelong hero --an act of wanton arrogance." In view of Nowak's subsequent behavior one must include him as well. Wilson has also been one of my heroes and I feel like one of the stunned people one sees on TV being interviewed after the nice man next door, who has been babysitting everyone's children for 30 years, is exposed as a serial killer.

Dawkins also points out (as he and others have done for many years) that inclusive fitness is entailed by (i.e., logically follows from) neo-Darwinism and cannot be rejected without rejecting evolution itself. If you want a serious book length account of social evolution (i.e. inclusive fitness) by an expert see Principles of Social Evolution by Andrew F.G. Bourke (see quotes later). Also presenting evidence fatal to 'true altruism' are Haig's 'Genomic Imprinting and Kinship' which shows the evolutionary battle between between the male and female derived genes in our cells as the prime force leading to imprinting (epigenetics) and Burt and Triver's 'Genes in Conflict' which also discusses the conflict between genes within every organism and of the mother with her fetus. Shackleford's works on sperm competition show how the genes competing even before fertilization ('Sperm Competition in Humans' and 'Female Infidelity and Paternal Uncertainty' will also show you why parents tend to invest more resources in their daughter's offspring than in their sons). Of course the classic popular accounts of selfish genes are the books of Dawkins.

After reading this book and its reviews, I dug into some of the scientific articles which responded to Nowak and Wilson and to Van Veelen's critiques of the Price equation upon which they heavily relied. The reviews noted that it has always been clear that the math of group or multilevel selection reduces to that of inclusive fitness (kin selection) and that it is not logically possible to select for behavior that does not benefit the genes that are unique to the actor and its immediate relatives. To put it bluntly, 'altruistic' behavior is always selfish in the end in the sense that it increases survival of the genes in the altruist. This to me is obvious from daily life and any scientists who claim otherwise have clearly lost their way. Yes, it does happen in the weirdness of modern life (i.e., so unlike the stone age society in which we evolved) that one sometimes sees a person give their life to protect a nonrelated person, but clearly they will not do it again and (provided its done before they replicate) any tendency to do it will not be inherited either. Even if they have already replicated they will on average leave behind fewer descendants than if they held back. This guarantees that any genetic tendency for 'true altruism' - i.e., behavior that decreases ones genes in the population-- will be selected against and no more than this very basic logic is needed to grasp evolution by natural selection, kin selection and inclusive fitness—all the mathematical niceties serving only to quantitate things and to clarify strange living arrangements in some of our relatives (e.g., ants, termites and mole rats).

The major focus of the group selectionist's ('groupies') attack is the famous Extended Price Equation that has been used to model inclusive fitness, published by Price about 40 years ago. The best papers debunking these attacks that I have found are those of Frank and Bourke and I will start with a few quotes from Frank 'Natural selection. IV. The Price equation' J. EVOL. BIOL. 25 (2012) 1002–1019.

'The critics confuse the distinct roles of general abstract theory and concrete dynamical models for particular cases. The enduring power of the Price equation arises from the discovery of essential invariances in natural selection. For example, kin selection theory expresses biological problems in terms of relatedness coefficients. Relatedness measures the association between social partners. The proper measure of relatedness identifies distinct biological scenarios with the same (invariant) evolutionary outcome. Invariance relations provide the deepest insights of scientific thought...Essentially, all modern discussions of multilevel selection and group selection derive from Price (1972a), as developed by Hamilton (1975). Price and Hamilton noted that the Price equation can be expanded recursively to represent nested levels of analysis, for example individuals living in groups... All modern conceptual insights about group selection derive from Price's recursive expansion of his abstract expression of selection... A criticism of these Price equation applications is a criticism of the central approach of evolutionary quantitative genetics. Such criticisms may be valid for certain applications, but they must be evaluated in the broader context of quantitative genetics theory...[and in a quote from Price ... 'Gene frequency change is the basic event in biological evolution. The following equation...which gives frequency change under selection from one generation to the next for a single gene or for any linear function of any number of genes at any number of loci, holds for any sort of dominance or epistasis, for sexual or asexual reproduction, for random or nonrandom mating, for diploid, haploid or polyploid species, and even for imaginary species with more than two sexes' ...]... Path (contextual) analysis follows as a natural extension of the Price equation, in which one makes specific models of fitness expressed by regression. It does not make sense to discuss the Price equation and path analysis as alternatives... Critiques of the Price equation rarely distinguish the costs and benefits of particular assumptions in relation to particular goals. I use van Veelen's recent series of papers as a proxy for those critiques. That series repeats some of the common misunderstandings and adds some new ones.

Nowak recently repeated van Veelen's critique as the basis for his commentary on the Price equation (van Veelen, 2005; Nowak et al., 2010; van Veelen et al., 2010; Nowak& Highfield, 2011; van Veelen, 2011; van Veelen et al., 2012... This quote from van Veelen et al. (2012) demonstrates an interesting approach to scholarship. They first cite Frank as stating that dynamic insufficiency is a drawback of the Price equation. They then disagree with that point of view and present as their own interpretation an argument that is nearly identical in concept and phrasing to my own statement in the very paper that they cited as the foundation for their disagreement... The recursive form of the full Price equation provides the foundation for all modern studies of group selection and multilevel analysis. The Price equation helped in

discovering those various connections, although there are many other ways in which to derive the same relations... Kin selection theory derives much of its power by identifying an invariant informational quantity sufficient to unify a wide variety of seemingly disparate processes (Frank, 1998, Chapter 6). The interpretation of kin selection as an informational invariance has not been fully developed and remains an open problem. Invariances provide the foundation of scientific understanding: 'It is only slightly overstating the case to say that physics is the study of symmetry' (Anderson, 1972). Invariance and symmetry mean the same thing (Weyl, 1983). Feynman (1967) emphasized that invariance is The Character of Physical Law. The commonly observed patterns of probability can be unified by the study of invariance and its association with measurement (Frank & Smith, 2010, 2011). There has been little effort in biology to pursue similar understanding of invariance and measurement (Frank, 2011; Houle et al., 2011).'

I hope it is becoming clear why I chose the title I did for this article. To attack the Price equation and inclusive fitness is to attack not only quantitative genetics and evolution by natural selection but the universally used concepts of covariance, invariance and symmetry which are basic to science and to rationality. Furthermore, the clearly voiced religious motivation of Nowak invites us to consider to what extent such Christian virtues as true (permanently genetically self-diminishing) altruism and the brotherhood of man (woman, child, dog etc.) can be part of a rational program for survival in the near future. My take is that true altruism is a luxury for those who don't mind being evolutionary dead ends and that even in it's 'make believe' inclusive fitness version one will be hard pressed to find it when the wolf is at the door (the inescapable scenario for the 12 billion in the next century).

There is much more in this gem which goes into exquisite logical and mathematical detail (and likewise his many other papers-you can get all 7 in this series in one pdf) but this will give the flavor. Another amusing episode concerns tautology in math. Frank again: 'Nowak & Highfield (2011) and van Veelen et al. (2012) believe their arguments demonstrate that the Price equation is true in the same trivial sense, and they call that trivial type of truth a mathematical tautology. Interestingly, magazines, online articles and the scientific literature have for several years been using the phrase mathematical tautology for the Price equation, although Nowak & Highfield (2011) and van Veelen et al. (2012) do not provide citations to previous literature. As far as I know, the first description of the Price equation as a mathematical tautology was in the study of Frank (1995).' Wittgenstein exposes a nearly universal misunderstanding of the role of math in science. All math (and logic) is a tautology that has no meaning or use until it is connected to our life with words. Every equation is a tautology until numbers and words and the system of conventions we call evolutionary psychology are employed. Amazingly Lamm in his recent excellent article 'A Gentle Introduction to The Price Equation' (2011) notes this:

'The Price equation deals with any selection process. Indeed, we can define selection using it. It says nothing in particular about biological or genetic evolution, and is not tied to any particular biological scenario. This gives it immense power, but also means that it is quite possible to apply it incorrectly to the real world. This leads us to the second and final observation. The Price equation is analytic [true by definition or tautologous]. It is not a synthetic proposition [an empirical issue as to its truth or falsity]. We derived it based on straightforward definitions, and universal mathematical principles. The equation simply provides a useful way of interpreting the meaning of the straightforward definitions we started from. This however is not the case once you put the equation into words, thereby interpreting the mathematical relationships. If you merely say: '\_I define 'selection' to be the covariance blah blah blah,\_' you might be safe. If you say: '\_the covariance blah blah blah is selection,\_' you are making a claim with empirical content. More fundamentally, the belief that the rules of probability theory and statistics, or any other mathematical manipulation, describe the actual world is synthetic.'

In this regard also recommended is Helanterä and Uller's 'The Price Equation and Extended Inheritance' *Philos Theor Biol* (2010) 2:e101. 'Here we use the Price Equation as a starting point for a discussion of the differences between four recently proposed categories of inheritance systems; genetic, epigenetic, behavioral and symbolic. Specifically, we address how the components of the Price Equation encompass different non-genetic systems of inheritance in an attempt to clarify how the different systems are conceptually related. We conclude that the four classes of inheritance systems do not form distinct clusters with respect to their effect on the rate and direction of phenotypic change from one generation to the next in the absence or presence of selection. Instead, our analyses suggest that different inheritance systems can share features that are conceptually very similar, but that their implications for adaptive evolution nevertheless differ substantially as a result of differences in their ability to couple selection and inheritance.'

So it should be clear that there is no such thing as sidestepping the Price equation and that like any equation it has limitless applications if one only connects it to the world with suitable words.

As Andy Gardner put it in his article on Price (*Current Biology* 18#5 R198). Also see his 'Adaptation and Inclusive Fitness' *Current Biology* 23, R577–R584, July 8, 2013

'Such ideas were rather confused until Price, and later Hamilton, showed that the Price equation can be expanded to encompass multiple levels of selection acting simultaneously (Box 2). This allows selection at the various levels to be explicitly defined and separated, and provides the formal basis of group selection theory. Importantly, it allows the quantification of these separate forces and yields precise predictions for when group-beneficial behavior will be favoured. It turns out that these predictions are always consistent with Hamilton's rule,  $rb - c > 0$ . **Furthermore, because kin selection and group selection theory are both based upon the same Price equation, it is easy to show that the two approaches are mathematically exactly equivalent, and are simply alternative ways of carving up the total selection operating upon the social character.** Irrespective of the approach taken, individual organisms are expected to maximize their inclusive fitness — though this result follows more easily from a kin selection analysis, as it makes the key element of relatedness more explicit.'

Consequently, to have the 'groupies' attacking the Price is bizarre. And here is Bourke's recent summary of inclusive fitness vs 'groupism': (haplodiploid and eusocial refer to the social insects which provide some of the best tests).

'Recent critiques have questioned the validity of the leading theory for explaining social evolution and eusociality, namely inclusive fitness (kin selection) theory. I review recent and past literature to argue that these critiques do not succeed. Inclusive fitness theory has added

fundamental insights to natural selection theory. These are the realization that selection on a gene for social behaviour depends on its effects on co-bearers, the explanation of social behaviours as unlike as altruism and selfishness using the same underlying parameters, and the explanation of within-group conflict in terms of non-coinciding inclusive fitness optima. A proposed alternative theory for eusocial evolution assumes mistakenly that workers' interests are subordinate to the queen's, contains no new elements and fails to make novel predictions. The haplodiploidy hypothesis has yet to be rigorously tested and positive relatedness within diploid eusocial societies supports inclusive fitness theory. The theory has made unique, falsifiable predictions that have been confirmed, and its evidence base is extensive and robust. Hence, inclusive fitness theory deserves to keep its position as the leading theory for social evolution.'

However inclusive fitness (especially via the Extended Price Equation) explains much more than ant society, it explains how multicellular organisms came into being.

'The third insight of inclusive fitness theory is the demonstration that conflict between members of a society is potentially present if they are unequally related to group offspring, since differential relatedness leads to unequal inclusive fitness optima. From this has sprung an understanding of an immense range of kin-selected conflicts, including conflicts within families and eusocial societies and intragenomic conflicts that follow the same underlying logic. The corollary of this insight is that societies are stable to the extent that the inclusive fitness optima of their members coincide. This in turn provides the rationale for the entire 'major transitions' view of evolution, whereby the origin of novel types of group in the history of life (e.g. genomes within cells, multicellular organisms and eusocial societies) can be explained as the result of their previously independent constituent units achieving a coincidence of inclusive fitness optima through grouping. From this standpoint, a multicellular organism is a eusocial society of cells in which the members of the society happen to be physically stuck together; the more fundamental glue, however, is the clonal relatedness that (barring mutations) gives each somatic cell within the organism a common interest in promoting the production of gametes...Nowak et al. argued that their perspective assumes a 'gene-centred approach' that 'makes inclusive fitness theory unnecessary'. This is puzzling, because entirely lacking from their perspective is the idea, which underpins each of inclusive fitness theory's insights, of the gene as a self-promoting strategist whose evolutionary interests are conditional on the kin class in which it resides...In their model of the evolution of eusociality, Nowak et al. deduced that the problem of altruism is illusory. They wrote that 'There is no paradoxical altruism that needs to be explained' because they assumed that potential workers (daughters of a colony-founding female or queen) are 'not independent agents' but rather can be seen 'as "robots" that are built by the queen' or the 'extrasomatic projection of [the queen's] personal genome'. If this claim were correct, then only the queen's interests would need to be addressed and one could conclude that worker altruism is more apparent than real. But it is incorrect, for two reasons. One is that, as has repeatedly been argued in response to previous 'parental manipulation' theories of the origin of eusociality, the inclusive fitness interests of workers and the mother queen do not coincide, because the two parties are differentially related to group offspring. The second is that worker behaviours such as eating of the queen's eggs, egg-laying in response to perceived declines in queen fecundity, sex-ratio manipulation by destruction of the queen's offspring and lethal aggression towards the queen all demonstrate that workers can act in their own interests and against those of the queen. In the light of this proven lack of worker passivity, workers' reproductive self-sacrifice is paradoxical at first sight and this is the genuine problem of altruism that inclusive fitness theory has solved. (c) Alternative theory of eusocial evolution. **Nowak et al. [38] presented an 'alternative theory of eusocial evolution' (as alluded to in §2b), backed up by a 'mathematical model for the origin of eusociality'. However, these do not represent true alternative theories, either alone or in combination, because they do not make any points or predictions that have not been made within inclusive fitness theory'**

Speaking of various steps in a scheme suggested by Nowak et al, Bourke says:

'These steps constitute a reasonable scenario for the origin and elaboration of insect eusociality, but neither the sequence of steps nor the individual elements differ substantially from those that have been proposed to occur within the inclusive fitness framework...The alternative theory of eusocial evolution of Nowak et al. also exhibits two important weaknesses. To begin with, by allowing groups to form in multiple ways in step (i) (e.g. subsocially through parent-offspring associations but also by any other means, including 'randomly by mutual local attraction'), their scenario ignores two critical points that are inconsistent with it but consistent with inclusive fitness theory. First, the evidence is that, in almost all eusocial lineages, eusociality has originated in social groups that were ancestrally subsocial and therefore characterized by high within-group relatedness. Second, the evidence is that the origin of obligate or complex eusociality, defined as involving adult workers irreversibly committed to a worker phenotype, is associated with ancestral lifetime parental monogamy and hence, again, with predictably high within-group relatedness...In sum, Nowak et al. make a case for considering the effect of the population-dynamic context in which eusocial evolution occurs. But their alternative theory and its associated model add no fundamentally new elements on top of those identified within the inclusive fitness framework and, relative to this framework, exhibit substantial shortcomings...More fundamentally, as has long been recognized and repeatedly stressed, the haplodiploidy hypothesis is not an essential component of inclusive fitness theory, since Hamilton's rule for altruism can hold without the relatedness asymmetries caused by haplodiploidy being present. Highlighting the status of the haplodiploidy hypothesis to criticize inclusive fitness theory therefore misses the target. It also overlooks the fact that all diploid eusocial societies identified since the haplodiploidy hypothesis was proposed have turned out to be either clonal or family groups and so, as predicted by inclusive fitness theory, to exhibit positive relatedness. This is true of ambrosia beetle, social aphids, polyembryonic wasps, social shrimps and mole-rats. It is even true of a newly discovered eusocial flatworm. In short, the diploid eusocial societies, far from weakening inclusive fitness theory, serve to strengthen it...More broadly, the theory uniquely predicts the absence of altruism (involving lifetime costs to direct fitness) between non-relatives, and indeed no such cases have been found except in systems clearly derived from ancestral societies of relatives. Finally, inclusive fitness theory is unique in the range of social phenomena that it has successfully elucidated, including phenomena as superficially dissimilar as the origin of multicellularity and the origin of eusociality, or intragenomic conflicts and conflicts within eusocial societies. Overall, no other theory comes close to matching inclusive fitness theory's record of successful explanation and prediction across such a range of phenomena within the field of social evolution. The challenge to any approach purporting to replace inclusive fitness theory is to explain the same phenomena without using the insights or concepts of the theory...Recent critiques of inclusive fitness theory have proved ineffective on multiple fronts. They do not demonstrate fatal or unrecognized difficulties with inclusive fitness theory. They do not provide a distinct replacement theory or offer a similarly unifying approach. They do not explain previously unexplained data or show that explanations from inclusive fitness theory are invalid. And they do not make new and unique predictions. The latest and most comprehensive critique of

inclusive fitness theory, though broad-ranging in the scope of its criticism, suffers from the same faults. Certainly, relatedness does not explain all variation in social traits. In addition, the long-standing message from inclusive fitness theory is that particular combinations of non-genetic (e.g. ecological) and genetic factors are required for the origin of eusociality. **Nonetheless, relatedness retains a unique status in the analysis of eusocial evolution because no amount of ecological benefit can bring about altruism if relatedness is zero.**

Andrew F. G. Bourke The validity and value of inclusive fitness theory *Proc. R. Soc. B* 2011 278, doi: 10.1098/rspb.2011.1465 14 September(2011)

**One thing rarely mentioned by the groupies is the fact that, even were 'group selection' possible, selfishness is at least as likely (probably far more likely in most contexts) to be selected for as altruism.** Just try to find examples of true altruism in nature –the fact that we can't (which we know is not possible if we understand evolution) tells us that its *apparent* presence in humans is an artefact of modern life concealing the facts and that it can no more be selected for than the tendency to suicide (which in fact it is). One might also benefit from considering a phenomenon never (in my experience) mentioned by groupies--cancer. No group has as much in common as the (originally) genetically identical cells in our own bodies--a 100 trillion cell clone-- but we all born with thousands and perhaps millions of cells that have already taken the first step on the path to cancer and generate millions to billions of cancer cells in our life. If we did not die of other things first, we (and perhaps all multicellular organisms) would all die of cancer. Only a massive and hugely complex mechanism built into our genome that represses or derepresses trillions of genes in trillions of cells, and kills and creates billions of cells a second, keeps (the majority of us) alive long enough to reproduce. One might take this to imply that a just, democratic and enduring society for any kind of entity on any planet in any universe is only a dream, and that no being or power could make it otherwise. It is not only 'the laws' of physics that are universal and inescapable, or perhaps we should say that inclusive fitness *is* a law of physics.

In a bizarre twist, it was apparently such thoughts that drove Price (creator of the Price equation and a devout Christian) to suicide.

Regarding the notions of 'law' and 'theory', it is a classic Wittgensteinian language game—a group of uses loosely linked but having critical differences. When it was first proposed, Evolution by natural selection was indeed highly theoretical, but as time passed it became inextricably linked to so many observations and experiments that it's basic ideas were no longer any more theoretical than that vitamins play critical roles in human nutrition. For the 'Theory of Deity' however it is not clear what would count as a definitive test. Perhaps the same is true of String Theory. The definitive analysis of how uncertain testable observations come to be part of our unchallengeable true-only nexus of certainty is Wittgenstein's 'On Certainty' (see my review).

Many beside groupies note the pleasant nature of much human interaction and see a rosy future ahead-- but they are blind. It is crushingly obvious that the pleasantry is a transient phase due to abundant resources produced by the merciless rape of the planet, and as they are exhausted in the next two centuries or so, there will be misery and savagery worldwide as the (likely) permanent condition. Not just movie stars, politicians and the religious are oblivious to this, but even very bright academics who should know better. In his recent book 'The Better Angels of Our Nature' one of my most admired scholars Steven Pinker spends half the book showing how we have gotten more and more civilized, but he seems never to mention the obvious reasons why--the temporary abundance of resources coupled with massive police and military presence facilitated by surveillance and communication technologies. As industrial civilization collapses, it is inevitable that the Worst Devils of Our Nature will reappear. One sees it in the current chaos in the Middle East and Africa and even the world wars were Sunday picnics compared to what's coming. Perhaps half of the 12 billion then alive will die of starvation, disease and violence, and it could be many more.

Another unpleasant fact about altruism, generosity and helping, virtually never mentioned, is that if you take a global long term view, in an overcrowded world with vanishing resources, helping one person hurts everyone else in some small way. Each meal, each pair of shoes create some pollution and some erosion and use up some resources, and when you add 7 billion of them together (soon to be 12) it is clear that one person's gain is everyone else's loss. Every dollar earned or spent damages the world and if countries cared about the future they would reduce their GDP (gross destructive product) every year. Even were groupism true this would not change.

The facts that Wilson, Nowak et al have for four years persisted in publishing and making extravagant claims for grossly inadequate and thoroughly debunked work is not the worst of this scandal. It turns out that Nowak's professorship at Harvard was purchased by the Templeton Foundation—well known for its pervasive sponsorship of lectures, conferences and publications attempting to reconcile religion and science. Nowak is a devout Catholic and it appears that a large gift to Harvard was contingent on Nowak's appointment. Any of the groupies could have gone to the experts to learn the error of their ways (or just read their papers). But Nowak has received something like \$14 million in Templeton grants in a few years and who wants to give that up?

Regarding Nowak and Highfield's book 'SuperCooperators' I will let Dawkins do the honors:

'I have read the book by Nowak and Highfield. Parts of it are quite good, but the quality abruptly, and embarrassingly, plummets in the chapter on kin selection, possibly under the influence of E O Wilson (who has been consistently misunderstanding kin selection ever since Sociobiology, mistakenly regarding it as a subset of group selection). Nowak misses the whole point of kin selection theory, which is that it is not something additional, not something over and-above 'classical individual selection' theory. Kin selection is not something EXTRA, not something to be resorted to only if 'classical individual selection' theory fails. Rather, it is an inevitable consequence of neo-Darwinism, which follows from it deductively. To talk about Darwinian selection MINUS kin selection is like talking about Euclidean geometry minus Pythagoras' theorem. It is just that this logical consequence of neo-Darwinism was historically overlooked, which gave people a false impression that it was something additional and extra. Nowak's otherwise good book is tragically marred by this elementary blunder. As a mathematician he really should have known better. It seems doubtful that he has ever read Hamilton's classic papers on inclusive fitness, or he couldn't have misunderstood the idea so comprehensively. The chapter on kin selection will discredit the book and stop it being taken seriously by those qualified to judge it, which is a pity.' You can find this on the site [whyevolutionistrue](http://whyevolutionistrue) 2011/03/16.

A scathing review of 'SuperCooperators' also appeared from eminent game theorist/economist/political scientist (and Harvard alumnus) Herbert Gintis (who recounts the Templeton scandal therein), which is quite surprising considering his own love affair with group selection— see the review of his book with Bowles by Price [www.epjournal.net](http://www.epjournal.net) – 2012. 10(1): 45-49.

In the end it is clear that this whole sad affair will be only the tiniest bump on the road and, like all things which exercise our attention now, will soon be forgotten as the horrors of unrestrained motherhood bring society crashing down. But one can be sure that even when global warming has put Harvard beneath the sea and starvation, disease and violence are the daily norm, there will be those who insist that it is not due to human activities (the opinion of half the American public currently) and that overpopulation is not a problem (the view of 40%), and there will be billions praying to their chosen deity for a rain of Big Macs from the sky, and that (assuming the enterprise of science has not collapsed, which is assuming a lot) someone somewhere will be writing a paper embracing group selection.