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Justice as a Natural Phenomenon*

He who understands *Baboon* would do more
towards metaphysics than John Locke.

Charles Darwin

Abstract: This paper summarizes a theory of fairness that replaces the metaphysical foundations of the egalitarian theory of John Rawls and the utilitarian theory of John Harsanyi with evolutionary arguments. As such, it represents an attempt to realize John Mackie's call for a theory based on the data provided by anthropologists and the propositions proved by game theorists. The basic claim is that fairness norms evolved as a device for selecting one of the infinity of efficient equilibria of the repeated game of life played by our prehuman ancestors.

0. Introduction

This note introduces a symposium on my book *Natural Justice* (Binmore 2005) in the journal *Analyse & Kritik*. The book is already a much abbreviated version of the two volumes of my earlier *Game Theory and the Social Contract* (Binmore 1994; 1998). All I can therefore do here is to offer some of the flavor of my attempt to study the evolution of fairness norms.

There is no way that I can respond in advance to the many objections that are inevitable when arguing in favor of the unpopular claim that morality is a natural phenomenon. Critics quote respected authorities like Plato, René Descartes, Jean-Jacques Rousseau and Immanuel Kant against my position. John Rawls and John Harsanyi, from whom I draw much of my inspiration, would have done the same. But it should not be forgotten that naturalism also has famous advocates, notably Aristotle, Epicurus, Thomas Hobbes and David Hume. In modern times, John Mackie's (1977) *Inventing Right and Wrong* has been particularly influential, and I am unashamed to be one of those who take seriously his injunction that we will never understand how morality works if we neglect the facts of anthropology and the propositions of game theory.

* The support of the ESRC Centre for Economic Learning and Social Evolution at University College London, and that of the California Institute of Technology is gratefully acknowledged.

1. What is fair?

When a dish in short supply is shared at a polite dinner party, there is seldom any verbal dispute. If things go well, the dish gets divided without any discussion or intervention by the host. When questioned, everybody will agree that each person should take his fair share. But how do we know what is fair?

This is not a simple question. What is judged to be fair according to our current standards of morality depends on a complex combination of contingent circumstances—like who is fat and who dislikes cheese. Moreover, if we observe what actually happens, rather than what people say should happen, we will find that it also depends on how each person at the table fits into the social pecking order. Woe betide the poor relative sitting at the table on sufferance in the eighteenth century who helped himself to an over-generous portion of his favorite dish!

Numerous scholars have tried to make sense of the calculations that people must implicitly have made when they coordinate on an outcome that they afterwards describe as fair. It surely can be no accident that the consensus is firmly in favor of some type of do-as-you-would-be-done-by principle. Moralists down the ages have offered numerous arguments that seek to explain why it is morally imperative that each person should follow such a golden rule. But none of these traditional arguments are founded on anything solid. I think we get suckered into taking them seriously because we are too ready to confuse a fairly accurate description of *what* we do in certain situations with an explanation of *why* we do it.

Rather than resorting to metaphysical speculation, I think that the first step on the road to understanding the human thirst for justice lies in the recognition that variants of the do-as-you-would-be-done-by principle are *already* firmly entrenched among the instincts and customs that regulate our lives. The relevant norms do not survive because we consciously cherish them. On the contrary, I think that most of our habituated behaviour is acquired via processes that operate below the level to which our conscious minds have easy access. Like the other great apes, we are programmed to imitate the behaviour of our more successful neighbors. If those in thrall to a particular habit or custom are perceived as being winners, then their habituated behaviour will be copied, without any need for anyone to understand *why* the habituated behaviour works well in the current social environment.

A fairness norm may be a do-as-you-would-be-done-by principle, but many such principles can be formulated. Which of these deserves our attention? To my knowledge, only one principle has been proposed that adequately responds to objections like: don't do unto others as you would have them do unto you—they may have different tastes from yours.

This paper will need to refer to both Rawls (1972) and Harsanyi (1977) in studying this fairness principle, but the terminology will be that of Rawls' *Theory of Justice*. Rawls proposes the *original position* as a hypothetical standpoint to be used in making judgments about how a just society should be organized. Each citizen is asked to envisage the social contract to which he would agree *if*

his current role in society were concealed from him behind a *veil of ignorance*. In considering the social contract on which to agree under such hypothetical circumstances, each person will pay close attention to the plight of those who end up at the bottom of the social heap. Devil take the hindmost is not such an attractive principle when you yourself may be at the back of the pack.

I think that the reason most people find the device of the original position intuitively attractive as a fairness criterion has nothing to do with the Kantian arguments offered by Harsanyi and Rawls. I believe that its appeal lies in the fact that we recognize it as a stylized version of a principle that we already unconsciously apply every day when interacting with our peers. From such a perspective, fairness is interpreted entirely in naturalistic terms. The original position is merely a device that has been washed up on the beach along with the human race by the forces of biological and social evolution. If we can figure out precisely how we use it at present to avoid inefficient disputes over small matters, perhaps we will also be able to use it to achieve stable political compromises over large-scale issues.

The defense for such a proposal is entirely pragmatic. Here is a tool supplied by Nature. Let us use it to improve our lives, just as we use whatever tools we find in our toolbox when making repairs around the house. But we shall get nowhere in this enterprise if we refuse to be realistic about how the device of the original position functions in our daily life at present.

2. Psychological Equity Theory

Our capacity for objective introspection is notoriously limited. What we say about our beliefs and motivations is often absurdly at variance with our behavior. Experimental work is therefore necessary to discover how we actually split a surplus when we believe ourselves to be acting fairly.

Social psychologists who have conducted experiments on fairness have been led to an empirically based law that resolves problems of social exchange by equating the ratio of each person's gain to his worth (Furby 1986; Mellers 1982; Mellers/Baron 1993; Wagstaff 2001; Walster *et al* 1978). People who are deemed worthy therefore get more of the gravy than others. As in Wilson (1993), this theory is usually referred to as 'modern equity theory', although it originates with Aristotle (NE) and has been little developed since it was introduced to social psychologists by Homans (1961) and Adams (1963/1965) more than thirty years ago.

The psychological theory of equity requires that a surplus be shared in proportion to each person's worthiness. A fair social contract for Adam and Eve in the Garden of Eden would therefore determine their gains g_A and g_E from cooperation according to the equation

$$\frac{g_A}{w_A} = \frac{g_E}{w_E}, \quad (1)$$

where the constants w_A and w_E quantify how the relative worth of Adam and Eve is assessed. But how are gains to be measured? Where is the zero to be

located on whatever scale is chosen? How is worthiness to be construed? Is it to be measured in terms of social status, merit, effort, need, or what? The psychological literature argues that the answers to these questions depend heavily on the context. But what is the rule that maps a context onto the relevant scales for measuring gain and worthiness?

To answer such questions, one needs a background theory to suggest critical experiments. I believe that such a theory can be constructed by asking how the apparatus of the original position proposed by Harsanyi (1977) and Rawls (1972) might have evolved from prehistoric food-sharing agreements between members of the same family.

3. Natural Duty?

Rawls (1972) invented the device of the original position to provide a properly argued alternative to utilitarianism. Harsanyi (1977) appealed to precisely the same device when defending utilitarianism. I support Harsanyi in this dispute, since Rawls succeeds in evading a utilitarian conclusion only by throwing orthodox decision theory overboard. However, I think that Rawls' intuitive grasp of the type of outcome to which one is led by applying the original position under realistic conditions is much sounder. Rawls advocates redistributing worldly goods according to the maximin criterion, which demands that we give priority to ensuring that the worst-off members of society get as much as possible.

The simplest possible setting for a discussion of these issues makes Adam and Eve the only two members of a society inhabiting the Garden of Eden. A social contract is modeled as a pair $x = (x_A, x_E)$ of utilities. The convex set X contains all the social contracts that are feasible. In particular, the set X contains Adam and Eve's current inefficient social contract $s = (s_A, s_E)$, on which they are seeking to improve. I follow Hobbes in calling s the *state of nature*.

Three bargaining solutions from cooperative game theory are relevant: the Nash bargaining solution n ; a weighted utilitarian solution h ; and the proportional or egalitarian bargaining solution r .

The Nash bargaining solution is a prediction of the agreement that a rational Adam and Eve would reach if they were to bargain face-to-face, using whatever bargaining power was available to them in an attempt to gain as large a payoff for themselves as possible. The utilitarian and egalitarian bargaining solutions incorporate differing notions of fairness reflected in their dependence on some standard of interpersonal comparison of utility. I model this standard using two positive constants w_A and w_B , although it is only the ratio of these *social indices* that is significant.

The utilitarian solution relative to these social indices is the pair h of payoffs in the feasible set X at which the utilitarian sum

$$\frac{x_A}{w_A} + \frac{x_E}{w_E}$$

is largest. The egalitarian solution is the pair r in the feasible set X at which

$$\frac{x_A - s_A}{w_A} = \frac{x_E - s_E}{w_E}.$$

The social indices have very different interpretations in the two cases. In the utilitarian case, a player with a small index is favored. In the egalitarian case, a player with a large index is favored.

Two important features of the egalitarian bargaining solution should be noted. The first is that r can be identified with the result of applying the psychological equity law. The second point is that r is also the result of applying the Rawls' difference principle—which is the same as the maximin criterion—to $(x_A - s_A)/w_A$ and $(x_E - s_E)/w_E$ (rather than to x_A and x_E directly). Such a correction corresponds to relocating the zeros and units on Adam and Eve's utility scales in order to ensure that our standard of measurement matches the manner in which interpersonal comparisons of welfare are made in the society under study.

I think Rawls' attempt to derive the maximin criterion from an analysis of how Adam and Eve will bargain behind the veil of ignorance goes awry at two points. He should not have adopted the iconoclastic expedient of denying orthodox decision theory, and he should not have joined with Harsanyi in assuming that Adam and Eve are *committed* to the hypothetical deal reached in the original position. Rawls (1972, 115) says that we have a “fundamental natural duty . . . to comply with just institutions”, but I think that he and Harsanyi are really just indulging in some wishful thinking. It would certainly make life more pleasant if we instinctively rated the call of justice above our own selfish concerns, but the evidence for such a claim is not very favorable.

	<i>dove</i>	<i>hawk</i>
<i>dove</i>	2 2	3* 0
<i>hawk</i>	3* 0	1* 1*

Figure 1: The Prisoners' Dilemma. Adam is free to choose a row and Eve a column. The result is one of the four cells in the payoff table. Adam's utility is written in the bottom left of this cell, and Eve's in the top right. The starred entries show best replies. The cell corresponding to both players choosing *hawk* is a Nash equilibrium, because each is then making a best reply to the choice made by the other.

The commitment problem arises in its starkest form in the study of the Prisoners' Dilemma of Figure 1. If Adam and Eve discuss how they should play this game, whether behind a veil of ignorance or not, they are likely to agree that both should play *dove*. Each will then receive a payoff of 2.

If they are irrevocably committed to the agreement, then this is the end of the story. But if they aren't committed, then they have the opportunity to cheat on the agreement when the time comes to play. Since cheating on the deal by playing *hawk* is optimal for each player whatever strategy the other chooses, the result will be that both play *hawk*. Each then receives a payoff of 1.

When Adam and Eve both choose *hawk* in the Prisoners' Dilemma, each is using a strategy that is an optimal reply to the strategy choice of the other. Game theorists register that a pair of strategies has this property by calling it a Nash equilibrium. If an authoritative book on game theory records the rational solution to a game, it must be a Nash equilibrium—otherwise it would be rational for at least one player to deviate from the book's recommendation. More importantly for our current purpose is the fact that an evolutionary process that always moves in the direction of better replies can only stop at a Nash equilibrium.

Various attempts to escape the conclusion that rational play calls for both players to act like hawks in the one-shot Prisoners' Dilemma have been proposed. Many of these postulate that Nature has equipped us with *internal* commitment mechanisms, whose engagement can be convincingly transmitted to an opponent (Binmore 1994). But where is the evidence that such internal mechanisms exist? Why would they be evolutionarily stable? If such mechanisms do exist, how come that nearly all human subjects in laboratory experiments end up playing *hawk* after playing the Prisoners' Dilemma for money ten times or so? (Ledyard 1995)

Since no adequate answers are on offer, game theorists restrict their attention to *external* commitment mechanisms. For example, if Adam and Eve sign a legal contract under modern circumstances to play *dove* in the Prisoners' Dilemma, then each will regard themselves as committed to the agreement, since any breach of the contract will be punished by our judicial system. Other external enforcement agencies have operated in other places and at other times. Fear of mockery or ostracism by one's peer group is a particularly effective form of disciplining agreements.

In postulating an evolutionary history for the device of the original position, it is therefore important that we take a view on the extent to which an external source of authority for policing agreements was available in the relevant period of prehistory. If an external enforcement agency were available in the form of a benign dominant leader or strong peer pressure, then Harsanyi's (1977) analysis suggests that our fairness norms would be utilitarian in character. However, when a similar analysis is applied to the case when no external enforcement agency at all exists, one is led to fairness norms that implement the egalitarian bargaining solution (Binmore 1994; 1998; 2005). But there was surely nothing sophisticated available in the way of external enforcement when our hominid ancestors first acquired a sense of fairness.

4. Reciprocity

The one-shot Prisoners' Dilemma is very misleading if used as a model of the human game of life. Since its only Nash equilibrium requires each player to cheat on any cooperative agreement, we would not have evolved as social animals if it were our game of life. As explained first by David Hume (1739/1978), the mechanism that sustains human cooperation is *reciprocity*. But Adam cannot threaten not to scratch Eve's back if she won't scratch his, without presupposing that they have an ongoing relationship to nourish. To model such self-policing, long-term relationships, we need to study the Nash equilibria of games that are to be *repeated* an indefinite number of times. If the players are sufficiently forward-looking that future payoffs seem nearly as good as current payoffs, they will be reluctant to cheat on their partners today for fear of losing the fruits of cooperation tomorrow.

Trivers (1971) introduced this idea into biology under the name of *reciprocal altruism*. Axelrod (1984) popularized the notion further by explaining why it is a Nash equilibrium in the indefinitely repeated Prisoners' Dilemma for each player to use the strategy TIT-FOR-TAT. Since the resulting outcome is that each player receives a payoff of 2 each time the Prisoners' Dilemma is repeated, one learns that rational cooperation is possible without any need to call upon the services of an external enforcement agency. However, the fuss about TIT-FOR-TAT obscures the fact that the problem in studying an indefinitely repeated game is not *whether* cooperative equilibria exist, but *which* of the many cooperative equilibria should be selected.

In the early fifties, long before Trivers or Axelrod, several game theorists independently discovered the *folk theorem* that characterizes the whole set of Nash equilibrium outcomes of an indefinitely repeated game (Aumann/Maschler 1995). For example, suppose that our feasible set X is the set of all payoff pairs that Adam and Eve could achieve on average in their indefinitely repeated game of life. After studying the one-shot Prisoners' Dilemma, one might guess that most of these outcomes will be unavailable as stable social contracts because they will fail to be achievable as Nash equilibrium outcomes. But this guess is mistaken. The folk theorem implies that *any* outcome that Adam and Eve both prefer to the state of nature s is available as a Nash equilibrium in the indefinitely repeated game. In particular, the cooperative outcome $(2, 2)$ is available as a Nash equilibrium in the indefinitely repeated Prisoners' Dilemma.

The problem for evolution in creating a cooperative species is therefore not that there are no cooperative social contracts available as Nash equilibria in our indefinitely repeated game of life, but that there are an embarrassingly large number of such equilibria. Nature therefore had to evolve an equilibrium selection device to solve this problem. I believe that fairness is her solution to this equilibrium selection problem in those cases when a dominant leader is unavailable.

If one accepts that fairness norms evolved to coordinate behavior on an equilibrium in a repeated game of life in the absence of any external enforcement agency, then one must also accept that the procedure required to implement

the fairness norm must be as self-policing as the equilibrium it is designed to select. Far from postulating a natural duty to be just, I therefore assume that people will cheat on the judicial procedure whenever they can. The only procedures that are viable are therefore those that provide nobody with a motive to cheat. As observed in Section 4, adopting this principle requires that the approach of Harsanyi (1977) and Rawls (1972) be very substantially modified. Rather than being led to the utilitarian bargaining solution that results if one applies orthodox decision theory with external enforcement, one is led instead to an egalitarian bargaining solution.

However, a major problem remains. The social indices w_A and w_E are undetermined in our specification of the egalitarian bargaining solution. But we need to know what values to assign to them if we are to apply the egalitarian solution to the problem of selecting an equilibrium in a game like the indefinitely repeated Prisoners' Dilemma.

5. Interpersonal Comparison of Utility

The laboratory experiments that led psychologists to formulate their equity law suggest that modern fairness norms are egalitarian rather than utilitarian, but further experimentation has been hindered by a lack of a background theory able to make predictions about how the worthiness coefficients w_A and w_E should be anticipated to vary with the context. So what does my theory have to say on this subject?

I argue that the food-sharing agreements with which human cooperation presumably began originated within the family. Since we share genes with our kin, it would be surprising if we were not biologically programmed to write their welfare into our utility functions according to their degree of relationship to us. For example, according to Hamilton's (1963; 1964) rule, if Eve is Adam's full cousin, then he should care for her one eighth as much as he cares for himself. The reason is that the probability that her body is playing host to any specific gene in his body is $1/8$. My guess is therefore that we are biologically hardwired to assess the probable degree of relationship to those we encounter within the family circle, and to use this a standard for making interpersonal comparisons when comparing their lot with our own.

But the interesting case consists of our fairness transactions with strangers. I believe that the fairness algorithm itself is biologically hardwired, but that its adaptation for use with strangers must have been contrived by *cultural* evolution. We learned to adopt strangers into our clans by treating them as relatives. But the degree of relationship attributed to such adopted strangers must have been socially determined. However, if the worthiness of someone outside the family circle is a social convention, then it need not be constant as the context varies. Nor need it be invulnerable to change over time.

The latter consideration is particularly important, since it allows predictions to be made about how worthiness coefficients will adjust over time in a fixed context. In Binmore (1998), I argue that one must expect social evolution to

change how people perceive the worthiness of others until the egalitarian bargaining solution r coincides with the Nash bargaining solution n . In principle, one can then predict the relative size of w_A and w_E under ideal conditions. First locate the Nash bargaining solution for the feasible set X with *status quo* s . The ratio w_E/w_A is then the slope of the line joining s and n .

6. Anthropology

To what extent is the idea of a natural origin for our sense of fairness supported by anthropological data? Since ancestral social contracts leave no fossils, we can only look at the social contracts of those hunter-gatherer societies that survived into the last century.

The data seems strongly to suggest that the social contract of a society is closely linked to the economic means of production of the society. For example, private property becomes increasingly important as agriculture supercedes foraging as the primary economic activity. It is therefore necessary to restrict attention to *pure* hunter-gatherer societies if we are to have any hope of finding clues to the nature of ancestral social contracts. But when we look only at pure hunter-gatherers, the data is quite remarkable.¹

All the societies studied by anthropologists that survived into modern times with a pure hunter-gathering economy had similar social contracts. This applies across the world—to Kalahari bushmen, Greenland eskimos, Australian aborigines, and Brazilian indians. They tolerate no bosses, and they share—especially meat—on a very egalitarian basis.

I think that this is evidence that the deep structure of fairness—which I believe to be captured in a stylized form by Rawls' original position—is wired into the human genome. If so, it is therefore universal in the human species.²

What then of the differences in the fairness judgements between different modern societies documented in books like Elster's (1992) *Local Justice* or Young's (1994) *Equity*? I think the answer is that the standard of interpersonal comparison required as an input to the device of the original position is culturally determined.

That is to say, as with language, fairness norms all have a common deep structure, but the actual fairness norms operating in different societies differ because the cultural history of different societies leads them to make different worthiness judgements. Similarly, Japanese and French share a common deep structure with all other languages, but Japanese is spoken in Japan and French in France because the Japanese and the French have different cultural histories.

¹ See Bailey 1991; Damas 1972; Erdal/Whiten 1996; Evans-Pritchard 1940; Fürer-Haimendorf 1967; Gardner 1972; Hawkes *at al* 1993; Helm 1972; Isaac 1978; Kaplan/Hill 1985; Knauft 1991; Lee 1979; Riches 1982; Tanaka 1980; Megarry 1995; Meggitt 1962; Rogers 1972; Sahlins 1974; and Turnbull 1965.

² Which is not to concede anything to those who believe in moral absolutes. If our evolutionary history had been different, so would be the nature of our equilibrium selection device.

7. Nil desperandum!

The naturalistic views expressed in this paper are often attacked as dehumanizing or dispiriting. Do our lives really have no meaning? Are we no more than soulless beasts, like apes or robots? People often refuse to believe that anyone could really hold such supposedly bleak views on the nature of human existence. What would be the point of going on with life if such things were true?

One answer is that Nature doesn't care whether we like her truths or not. For example, I am unenthusiastic about Einstein's theory of relativity because it means that we shall probably never reach the stars, but this doesn't seem a good reason for returning to Newton.

But to reply in such a vein is like saying yes or no when asked if you have stopped beating your wife. The right response is to deny the premise. The things one has to believe if one takes a naturalistic viewpoint seriously are neither dehumanizing nor dispiriting. In particular, the idea that telling ourselves the truth about ourselves will somehow throw a wrench into the works seems to me quite ridiculous—rather like the claim I just read in a popular science book that our bodies would fly apart if the quantum theory were false. Of course they wouldn't! They would continue to operate exactly as before. All that would change is that we would need to find a better explanation of how the universe works.

Society will not collapse if people recognize that they are essentially no different from apes or robots. If we are indeed apes or robots, then everything that humans currently think or do is something that apes or robots can think or do. In particular, the way that a human society operates is one of the ways that a society of apes or robots can operate.

The loss of religious faith provides a good example. While holding onto their belief in God, people typically think that life would be impossible for them without their faith. Without God at the helm, life would lose its point, society would fall apart, wickedness would prevail, and so on. But after an apostate has recovered from the trauma of losing his faith, he finds that daily life goes on just as before. Nor are irreligious people noticeably less caring or good-hearted than their churchgoing brethren—they simply find it possible to get on with their lives without the need to invent simplistic stories that supposedly explain everything around them. And so it is with those of us who have given up the fairy story that attributes a divine spark to human nature. Are we more wicked than others? Do we seem to have lost our zest for life? Are we more prone to suicide? Not as far as I can see.

As the ancient skeptics taught, contentment is possible without the need to cling to comforting beliefs. As proof, we have the example of the great David Hume who lived an entirely admirable life without any belief in the supernatural. His personal example shows that nobody need feel gloomy because life has no ultimate purpose or because conventional conceptions of moral responsibility are built on foundations of sand. So what if our fine feelings and intellectual achievements are just the stretching and turning of so many springs or wheels, or our value systems are mirrored by those of chimpanzees and baboons. Our

feelings are no less fine and our values no less precious because the stories we have traditionally told ourselves about why we hold them turn out to be fables. In discarding the metaphysical baggage with which the human race bolstered its youthful sense of self-importance, Hume taught us that we throw away nothing but a set of intellectual chains.

Far from being dehumanized or dispirited by his beliefs, Hume was the most civilized, companionable and contented of men—especially when compared with neurotic oddities like Rousseau or Kant, from whom the human race usually seeks inspiration on how best to live. Even on his deathbed, Hume retained his good humor, totally disarming Samuel Johnson’s biographer Boswell when he tactlessly quizzed him on how it felt to be at death’s door without a belief in the afterlife. As Boswell reports, “Mr. Hume’s pleasantries were such that there was no solemnity in the scene, and death for the time did not seem so dismal.”

Moral naturalism is therefore not a dangerous disease. To those of us who still cherish the Age of Enlightenment, it offers the only viable cure to the ailments that genuinely afflict our societies.

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