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An 'ism' for our times

John Ashworth

Marxism says it began and ended with class. But as a source for the social sciences, Darwinism is now taking its place.

The dissolution of the USSR and worldwide repudiation of Marxist political systems have had momentous effects which are far from complete. But no less complete, and possibly further reaching, has been the collapse of Marxism as a philosophical system that claimed to provide a basis for most, if not all, social sciences.

Marx believed himself to be a scientist and his followers certainly thought of themselves as constructing a 'science'. Over the past century, many of their habits of mind and attitude have spilled over into the developing social sciences and have been adopted more or less unconsciously by many who would rightly have rejected a Marxist label. It is not proving easy to disentangle the useful from the discredited in this complicated intellectual legacy and there is a real hunger for something to replace the old framework. If classes, at least as defined in economic terms, and the class struggle no longer have the explanatory power they once did, what might?

Chairman of the Board of The British Library; formerly Director of the London School of Economics when the *Darwin Seminars* started.

Into this debate have come, triumphantly, those from the political right with individualistic philosophies which claim there is no such thing as society. Treading diffidently are those from the communitarian left who are aware of the lack of any real theoretical underpinnings to their pragmatic reworking of socialist thought. More tentative yet, are those who suggest that modern evolutionary theories, which predict that organisms may apparently act altruistically while still containing selfish genes, can account for why both the right and the new left seem to have only partial insights. Perhaps, they suggest, evolutionary theories might work where both individualistic and group (or class) based explanations of behaviour have proved unsatisfactory?

So should the evolutionary biologists and the social scientists try to see if they have anything fruitful to say to one another? The first attempts, by the sociologist Herbert Spencer and his followers at the turn of the century, were not encouraging. As Darwin himself well recognised, without a theory of genetics, or knowledge of the biochemical nature and behaviour of genetic material, there was little of real intellectual rigour for the biologists to contribute. More recent attempts by E O Wilson in the 1970s, under the banner of sociobiology, were also not encouraging despite there being theories of genetics and the mechanisms whereby seemingly altruistic behaviour might have been selected by evolutionary processes. Wilson's assertive tone was too reminiscent of Spencer's and many reacted, not to the new insights that Wilson was popularising, but to the previous attempts of Spencer and the social biologists of the 1930s. The passions and antipathies raised by those previous attempts at dialogue were still so strong that few non-biologists really noticed that a new paradigm, not a rehash of the old ones, was being used. Most biologists, accepting the charges of insensitivity and tactlessness, kept their heads down, and few will now wish to be called sociobiologists. But in guises such as evolutionary psychology, behavioural ecology or Darwinian anthropology, the implications of the new insights have been explored, and accessible and sensitive accounts of the results have been published in a form that might now lead to something other than a dialogue of the deaf.

I have been much encouraged by the tone of the discussions over the past year at the London School of Economics under the umbrella of the *Darwin Seminars*. It seems that at least some social scientists are now prepared to listen to what evolutionary thinking might have to contribute. All have been keen to ensure that having got rid of one kind of determinism (historical-cum-Marxist), another, equally pernicious form – genetic determinism – should not be smuggled into our theories of society. It must be stressed that all evolutionary accounts of human behaviour can be expected to do is to explain how certain things might have come to be. No value judgements are to be imputed and all were careful to stress that even if we, like other animals, have a predisposition to certain courses of action, we, unlike them, are not wholly creatures of instinct and can act differently if we choose to exert the necessary will.

An analogy from another of the natural sciences might at this point be helpful. The second law of thermodynamics tells us that water will not spontaneously and of its own accord flow uphill, but if we wish to construct pumps and supply them with energy we can make it do so. The energy expended is then related to the efficiency of the pumping mechanism and the height to which the water goes. Similarly, we can argue that although human beings have a predisposition to certain behaviour as a result of their evolutionary history, they can nevertheless construct social institutions, underpin them with customs or sanctions and, as a result, modify that behaviour. There is, of course, a correlation between the strength of the evolutionary pressures that have produced the behaviour in the first place and the strength of the social mechanisms needed to alter or reinforce it in a particular environment. The great contribution evolutionary thinking has to make is to help us understand the nature of that correlation and the strength of the forces involved.

It is too early to tell whether the results are yet of much practical help to policy makers, but I am encouraged enough to think they might soon be. The dialogue has begun and thus far, so good.

What is evolution?

Oliver Curry

Evolution by natural selection works on the simple principle that the better an organism is at reproducing itself, the more of it you will get. Over time, the individuals that are more successful in commandeering the resources needed for reproduction will displace those that are less successful. In the evolution of life on earth, genes are what get reproduced – genes being the intelligible lumps of DNA that carry instructions about how to build the various bits and pieces that go into creating you and every other organism that has ever existed. The 'selfishness' of genes, the single-minded pursuit of their own replication, has ensured they're still around today after billions of years of cut-throat competition.

> 'Putting genes in the driving seat often leads to the feeling that we are unwitting zombie hosts to a shady bio-Mafia whose plottings are best resisted'

The failure to grasp that selection occurs at the level of the gene has led to many notorious dead ends for evolutionary theory. Social Darwinists looked for examples of societies and individuals acting out

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the struggle for survival, and argued that those that succeeded were in some way better than those that did not. Convenient as these ideas were in justifying the expansionist and imperialist mood of the times, they relied on the false assumption that a society, or group of any size, is what gets selected. Group level explanations are wrong becasue they overlook the point that, try as you might, you'll never find a society reproducing itself *en masse*. Nor can group selection explain the seemingly selfless behaviour that underpins much social organisation. In a population containing altruistic individuals that make sacrifices for the good of the group or species, selfish mutants thrive at the altruists' expense until only selfishness remains. Adaptations persist only if they improve the chances of getting the genes that created them into the next generation.

However, having grasped that evolution is a product of the race between selfish replicators blindly copying themselves, it doesn't follow that people act in this way too. It is a nonsense to suppose selfish genes lead inexorably to selfish people. Genes can and do adopt a variety of strategies for ensuring their replication, both nice and nasty. The act of creating a body and brain is an intensely cooperative venture in itself. Also, many behaviours with a genetic basis – maternal care, sharing food, grooming – are far from what would traditionally be called self-serving.

It is one thing to accept that genes wire up the brain in such a way as to create certain behavioural dispositions, but quite another to assume we have genes for particular behaviours. This was the approach taken by sociobiology in the 1970s, which used evolutionary theory to account for a particular behaviour and then announced there must be genes for its root cause. While some of these accounts may be descriptively true, it is a naïve view of what lies between genes on the one hand and manifest behaviour on the other. This is a problem not least because genes themselves are not directly involved in the moment to moment management of our lives. Genes never see, or taste, or feel pain, or fall in love; they just build the bits that do. So there isn't a gene for crime, but it's likely there are genes for constructing a variety of cognitive functions that assess the costs and benefits of reneging on reciprocal arrangements and cross-check them against opportunity

costs, the experience of decisions taken in similar situations in the past, the chances and consequences of discovery, and how big the other bloke is.

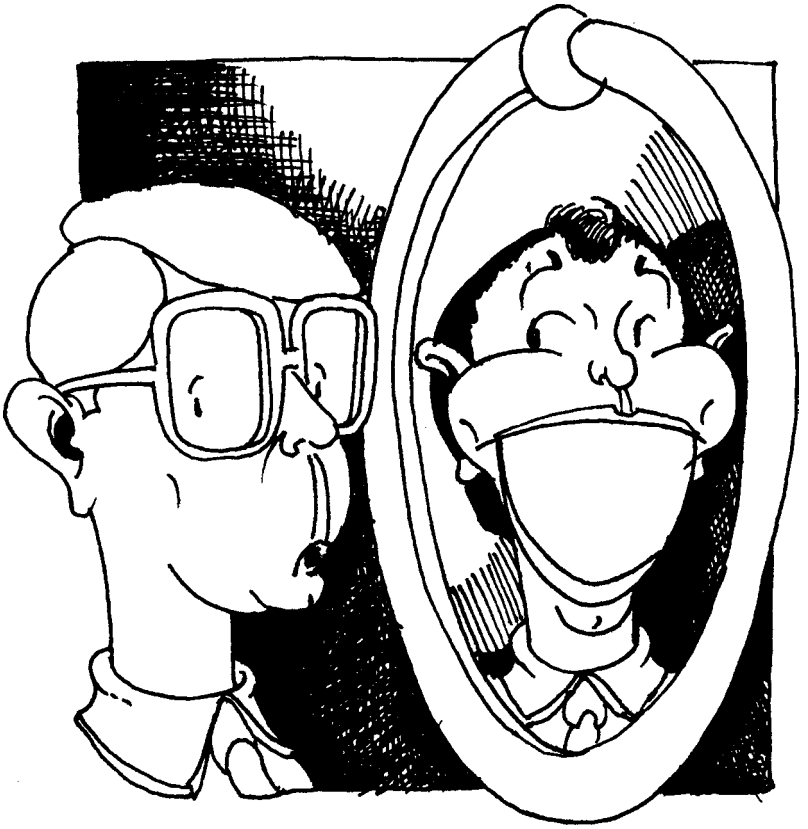
'The failure to grasp that selection occurs at the level of the gene has led to notorious dead ends for evolutionary theory'

Putting genes in the driving seat in this way often leads to the feeling that we are unwitting zombie hosts to an army of deterministic Machiavellian gremlins, a shady bio-Mafia whose plottings are best resisted and ideally thwarted. But behind the headlines, the vast majority of genes are quietly working away without the slightest sinister bent. Where would you be, for example, without the genes that control blood clotting, or generate pain and pull your hand away from a scalding kettle? What would happen if the genes that enabled you to learn a language or empathize with the feelings of another were absent? When you stop to consider the enormous number of things that could go wrong but don't, a little gratitude for the genes' industry and professionalism might not go amiss. More seriously, the charge of genetic determinism ignores the fact that genes are no more or less deterministic than other causes of social behaviour, such as culture or environment, that are so beloved of those who reject evolutionary explanations.

'Genes never see, or taste, or feel pain, or fall in love; they just build the bits that do'

Every baby is born with a brain adapted to solve the problems faced over millions of years by our Stone Age ancestors. Given that other animals manage with far less complicated mental machinery, one might ask why humans alone have ended up with such a weird and seemingly superfluous organ. Although it's not agreed what first gave human brains the opportunity to flourish, they have done so in an environment consisting largely of other people – the perfect conditions for an

escalated cognitive arms race. Not surprisingly then, much of evolutionary psychology concerns social relations of one sort or another, be they among members of a family, between the sexes, or among groups engaged in reciprocal exchange. Our psychologies have evolved to be acutely aware of the social environment, and given this common starting point, there's every reason for supposing the major differences between individuals might well be due to factors such as growing up in



'Try as you might, you'll never find a society reproducing itself *en masse*.' Then again…

a council flat or being educated at Eton. The point is to explain why we react in the ways we do to the stimuli around us.

This is where evolutionary psychology really comes into its own, drawing its strength from the identification of discrete mental tools designed for specific tasks and explaining, for example, how one bit of the brain is dedicated to reading facial expression while another is good at picking up the nuances of the human voice. The obvious question that arises is, why do we have one particular set of mental capacities over any other? Unless you're willing to argue that humankind plopped onto the earth in a fully formed state – which even the Pope is beginning to doubt – an appreciation of man's evolutionary history is crucial to answering this question. As genes are responsible for building these mental modules, you can account for their presence and distribution only by demonstrating how they've been better at getting their host to reproduce them than have other genes. From such simple principles as these, evolutionary theory may be poised to give us our first fully scientific account of human nature.

the evolutionist is an electronic magazine exploring what implications evolutionary theory has for understanding human nature. You can find it on the internet at http://www.lse.ac.uk/depts/cpnss/evolutionist

It's the biology, stupid

Sir Samuel Brittan

What can economics learn from Darwinism?

Unnatural pronouncements on human nature

Reactionaries have been accustomed to defend the most savage practices by claiming you can't change human nature. Progressives have parried, either, along with Rousseau, that human nature is inherently benign – though corrupted by bad political arrangements, or, in more recent times, that it is largely moulded by social institutions that could and should be changed.

There is endless discussion of human nature in heavy-weight treatises and bar-room discussions alike. Many political philosophers would say the relative attractions of different theorists such as Hobbes, Marx, Adam Smith and many others depends on one's view of the nature of man (using 'man' to stand for the species rather than a particular sex). Even dinner table arguments on, say, the pros and cons of Thatcherism, are brought to a provisional conclusion by the words, 'It all depends on your view of human nature'.

My own objection to such pronouncements is that the nature of the human species is not a matter for profound armchair theorising, but

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for biology. By biology I mean the study of human beings as members of the animal kingdom with special characteristics of their own.

Whether human beings have existed for 200,000 or two million years is a matter of how precisely they are defined. But, in any case, literate urban societies have existed only for a tiny fraction of human existence. During most of its time on earth, the species has consisted of small bands of not more than a couple of hundred hunter-gatherers; it is hardly surprising the characteristics developed during this time may create problems in coping with the Great Society of today (the 'Great Society' was a phrase coined by an early Fabian and London School of Economics professor, Graham Wallas, to describe the modern spontaneous order involving the impersonal interaction of millions of individuals).

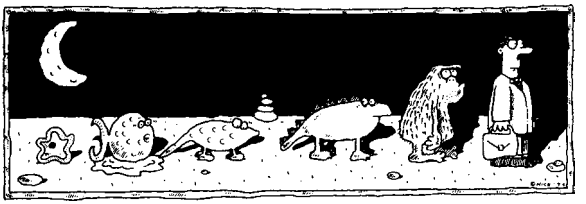
There are very general characteristics of human behaviour which reassert themselves in so many different times and places that it is simply stupid to deny there is a common thread running through them. On the other hand, the variety of practices is wide enough to suggest human nature is, within limits, malleable. We need to know more, then, about what these limits are and how best to exploit their scope for modification.

Darwinism: a natural selection

There are many different kinds of empirical approach to the study of our species which range from biochemistry and anthropological studies of primitive tribes, to comparative zoological investigations of, for example, the nature and extent of aggressiveness in different parts of the animal kingdom.

None of these approaches can be ruled out a priori; if we are lucky, approaches from different disciplines will reinforce each other. One reason for singling out modern Darwinism is that it seems to be, at least to an outsider, one of the most lively and developing fields.

The theory of natural selection is almost breathtakingly simple. It states that the most advanced forms of life evolved from the most primitive by a process of descent with modification which favoured the most successful in the struggle for survival. The theory has been



given a new lease of life by modern genetics. The notion of the selfish gene suggests the body is a survival machine created to enhance the gene's chances of continued replication.

However, what is good for the genes is not always good for the organism. Once salmon have fought their way upstream and successfully spawned, they literally fall apart. The evolutionary pressure is simply not in favour of a design that might give them an extended grandparents' retirement. Furthermore, genetics has itself been underpinned by biochemical revelations about the DNA molecule which provides the substance of heredity. Much more will be known about human chromosomes and their component genes when the international Human Genome Project is nearer completion.

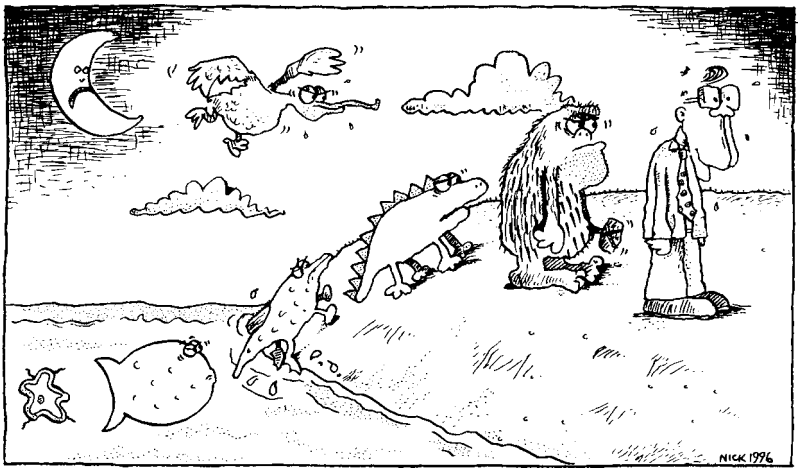
It should be noted that not all Darwinians are inclined to apply their findings to politics or the social sciences. Even among supporters of the selfish gene concept, there are those such as the inventor of the term, Richard Dawkins, who have emphasised that human beings have – unlike other species – developed culture as a largely autonomous system of symbols and values. In his book, *Darwin's dangerous idea*, Daniel Dennett is at pains to deny there are dangerous implications for human society.

There are other Darwinian writers such as Matt Ridley (who writes on the origins of commerce elsewhere in this *Quarterly*), the English naturalist, who take the view that culture does not leave us a blank slate and that there are natural pointers to what is and is not possible for human societies to achieve. In *The moral animal*, the US science writer Robert Wright goes as far as insisting evolutionary theory could be applied to public policy. The trap, which he does not always avoid,

is to confuse explaining the genetic basis for some apparently heroic self-sacrificing action with explaining it away.

A maladapted economy

Some readers will no doubt suspect my interest in Darwinism stems from a disillusion with economics, a subject on which I have written during most of my journalistic career. In fact, the similarities are as striking as the differences. For example, both modern neoclassical economics and neo-Darwinism are reductive. In principle, economists try to derive their theories from the behaviour of individuals maximising their utility within the constraints of finite resources and limited time, while neo-Darwinians try to take the principle down to the level of the gene in accounting for human propensities. The weakness of the economic model is that utility is a largely tautological concept, applied to whatever people are trying to maximise. This is all right for normative purposes if we take the view that individuals should indeed be allowed to make their own choices to the maximum extent, subject to them not harming the interest of others. But as a way of understanding what people are likely to do, even on average, it is circular.



It is a working assumption that people are guided by the desire to promote the material welfare of themselves, their family and close friends, with some lesser degree of concern for those more distant. Indeed, most attempts to write down utility functions have a place for benevolence or altruism. The political theorist has a parallel, though perhaps less developed, analysis of the pursuit of power and how it can be achieved. The father of such studies is surely the Italian Renaissance writer Niccolo Machiavelli.

Some Darwinian analysts have tried to push the analysis further. For both power and money can themselves be analysed as means towards reproductive success. In some societies both the wealth and power of the ruler have been inferred from the number of wives, concubines and children he could have. The pursuit of wealth may be a side effect of pursuing fundamental biological goals.

There are critics who have misinterpreted this view as a kind of Freudian analysis of people's innermost motives. But this is a misunderstanding. The Darwinian psychologist is not primarily concerned with what people may say on the couch or reveal in dreams. He or she is concerned with the conditions most likely to replicate genes. Creatures whose behaviour does not promote reproductive success will not survive to tell the tale.

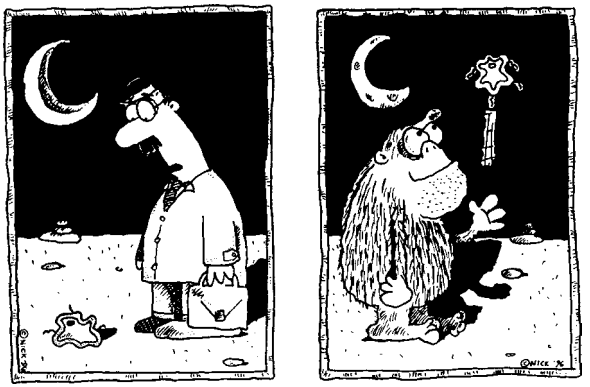
Evolutionary theorists can help provide some basis for altruistic behaviour. Two main types have been identified: kinship altruism and reciprocal altruism. An example of kinship altruism is the sacrifice of reproductive possibilities by the worker bees in a hive to promote the success of the queen bee, with whom they have genes in common. Reciprocal altruism is usually illustrated by means of the theory of games. Some degree of self-sacrifice for the sake of another's benefit may actually pay an organism in a repeated series of interactions on the assumption that others do the same. Then the benefit to a representative member of the whole group is increased. In the case of a herd of antelopes, some form of unconscious programming may lead one antelope to act as a sentinel to warn of the coming of predators. With human beings there may be a more conscious element of trust. To explain such behaviour is not to devalue it, but to provide some clues about when it is most likely to occur.

One similarity between neoclassical economics and modern Darwinism is the postulate of a spontaneous order. Until the pioneering work of Adam Smith, there was no real understanding of how the division of labour could arise spontaneously and human productivity be greatly enhanced without any central plan for the purpose. Most politicians and 'men in the street' still do not understand invisible hand mechanisms whereby the pursuit of self-interest leads to the common good, and remain collectivists, irrespective of how they vote. It was the achievement of Darwin and his successors to show how a highly intricate plant and animal world could develop without the deliberate design that theologians like William Paley once thought to be necessary. The advance from the amoeba to Bill Clinton or Albert Einstein is a result of a combination of stability and incremental change which, given enough time, will produce these transformations.

Much misunderstanding has been provoked by the belief that a spontaneous order is supposed to be a perfect one. Nothing of the kind. The most that the invisible hand explanations can suggest is that human arrangements are not just accidents, but the result of a long process of intricate change in which unsuccessful adaptations become jettisoned and successful ones reinforced. The reformer therefore requires understanding and caution if he or she is to make matters better rather than worse.

It has to be said, however, that the resemblances between neoclassical economics and evolutionary theory are fairly general ones of form. Economists and evolutionary biologists do not cooperate very much and are usually even physically far apart on university campuses.

The most successful economic applications of evolutionary ideas have been in areas such as the rise and fall of business firms. There is obvious scope here for metaphors of adaptation, natural selection and the extinction of maladapted species. Even here, however, there is nothing corresponding to the genetic analysis of modern biology. In areas of economics with which I have been most concerned, such as macroeconomics or the comparison of economic systems, there has been little cross-fertilisation. Applications of evolutionary theory to the question of central bank independence or the choice between



monetary and exchange rate targets are likely to be highly indirect for the foreseeable future.

There could be more application to unemployment, if it is accepted that an inherent part of the problem is that people are pricing themselves out of jobs, and that group solidarity prevents, for instance, science teachers being paid much more than arts teachers, or investigative financial journalists more than political or economic writers. But, on this issue, I must direct you to the speculations I have already made for the upcoming Demos Book, *Life after politics* (HarperCollins, January 1997). Even if I am right on the economics, the evolutionary contribution depends on a breakthrough in the analysis of group behaviour that is still to come.

Three outstanding problems

Meanwhile, not all the similarities between economics and Darwinian biology are reassuring. The obsession with the personality of Darwin and what he really thought and meant will be familiar to the political economist accustomed to such discussions about Keynes and many others. This is in contrast to physics, where arguments about what Einstein really meant and how he differed from Newton are mainly the province of historians of science.

Evolutionary theory has also brought back Aristotle's teleology – that is, it looks for the purpose and function of objects and processes – which physical science had previously banished. One aspect of it is known as adaptationism. This involves treating any feature, such as a giraffe's neck or the peacock's tail, as an adjustment to some feature of the environment. The method is reminiscent of how Chicago economists treat many phenomena, ranging from the common law to the conventions of family life, as optimal adaptations to the pursuit by human beings of maximum utility. Darwinians accept that some phenomena are just there by an accident of history, but argue that we should always begin by looking for an adaptationist explanation. This is all very well, so long as we realise that adaptation is rarely perfect. As well as the woodpecker's beak, there are residual remnants such as the human tail.

A more subtle problem is the absence of falsifiability. The philosopher Karl Popper gained widespread support for the view that scientific hypotheses can, in principle, be falsified by observation. But it is difficult to see which observations would falsify natural selection. Popper suggested evolutionary theory is a 'metaphysical research programme'. He meant it is not a falsifiable hypothesis, but the fruitful source of many such hypotheses at a lower level. For falsifiability, one needs prediction. However, both economists and Darwinian biologists are much better at telling the story after the event than predicting the events themselves.

One historical accident affected the development of evolutionary theory: the genetic basis of heredity did not become widely known until well after Darwin's death. Darwin himself did not know about chromosomes and genes, let alone the mechanisms by which spontaneous mutations occur, the most successful of which perpetuate themselves in their species. One wonders how the subject would have developed if the historical accident had been the other way round – if the work of Gregor Mendel, who lived in monastic obscurity, had been more widely disseminated in his own lifetime, or if Darwin had written a little later. I sometimes ask how much could be said about human development and characteristics on the basis of genetics and biochemistry without throwing in the notion of purpose or natural selection.

Controversies

There is a final reason for the continued controversy. Members of the chattering classes are instinctively suspicious of any attempts at any wide application of evolutionary theory to explain life, the universe and everything else. It must be admitted that all too many professed evolutionists have perverted Darwinism, espoused master race theories or opposed measures to help the poor under the slogan (which was not Darwin's, but Herbert Spencer's) of the 'survival of the fittest'.

But there is surely more to say. There are many features of human behaviour, such as the proclivity to divide into mutually hostile groups, which lie behind the horrors of Bosnia, Somalia or Chechnya, and which seem to cry out for some biologically based explanation. Even though genetic origins do not determine culture, they may yield warnings about the more and less fruitful prospects for reform.

Group solidarity seems an obvious inheritance from the era of small groups of hunter-gatherers. It still has its good side in the shape of kin affection, patriotism and helping one's neighbour. But the bad side is even more evident: violence against outsiders, willingness to back leaders who go to war and practise ethnic cleansing. The most trivial distinctions can divide people into mutually hostile factions who see hostility increases with time, as in Northern Ireland. There are unlikely to be easy answers in this area. But hunter-gatherers did not have nuclear weapons or biological warfare at their disposal. So the search must continue.

Political peacocks

Geoffrey F Miller

You thought they were out to change the world.
But evolutionists have it that politicos are simply striving to increase their sexual capital.

Suddenly, in the spring of 1986 in New York, hundreds of Columbia University students took over the campus administration building and demanded that the university sell off all of its stocks in companies doing business in South Africa. As a psychology undergraduate there, I was puzzled by the spontaneity, ardour and near-unanimity of the student demands for divestment. Why would mostly white, middle class North Americans miss classes, risk jail and occupy a drab office building for two weeks, in support of political freedom for poor blacks living in a country 6,000 miles away? The campus conservative newspaper ran a cartoon depicting the protest as an annual springtime mating ritual, with Dionysian revels punctuated by political sloganeering about this year's arbitrary cause. At the time, I thought the cartoon tasteless and patronising. Now, I wonder if it contained a grain of truth. Although the protests achieved their political aims only inefficiently and indirectly, they did function very effectively to bring together young men

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and women who claimed to share similar political ideologies. Everyone I knew was dating someone they'd met at the sit-in. In many cases, the ideological commitment was paper thin and the protest ended just in time to study for semester exams. Yet the sexual relationships precipitated by the protest sometimes lasted for years.

The hypothesis that loud public advertisements of one's political ideology function as some sort of courtship display designed to attract sexual mates, analogous to the peacock's tail or the nightingale's song, seems dangerous. It risks trivialising all political discourse, just as the conservative cartoon lampooned the Columbia anti-apartheid protests. The best way to avoid this pitfall is not to ignore the sexual undertones to human political behaviour, but to analyse them seriously and respectfully using the strongest and most relevant theory we have from evolutionary biology: Darwin's theory of sexual selection through mate choice.

The history

Most people think of Darwinian evolution as a blind, haphazard, unguided process in which physical environments impose capricious selection pressures on species, which must adapt or die. True, for natural selection itself. But Darwin seems to have become rather bored with natural selection by the inanimate environment after he published *The origin of species* in 1859. He turned to the much more interesting question of how animal and human minds can shape evolution. In his 1862 book, *On the various contrivances by which British and foreign orchids are fertilized by insects* he outlined how the perceptual and behavioural capacities of pollinators shape the evolution of flower colour and form. In his massive two volume work of 1868, *The variation of animals and plants under domestication* he detailed how human needs and tastes have shaped the evolution of useful and ornamental features in domesticates. Further works on animal emotions in 1872 and the behaviour of climbing plants in 1875 continued the trend towards an evolutionary psychology. Most provocatively, Darwin combined the frisson of sex with the spookiness of mind and the enigma of

human evolution in his two volume masterpiece of 1871, *The descent of man* and its companion *Selection in relation to sex.*

> 'People respond to policy ideas first as big-brained, idea infested, hypersexual primates, and only secondly as concerned citizens in a modern polity'

Darwin observed that many animals, especially females, are rather picky about their sexual partners. But why would it ever pay to reject a suitor? Being choosy requires time, energy and intelligence percentage costs that can impair survival. The basic rationale for mate choice is that random mating is stupid mating. It pays to be choosy because in a sexually reproducing species, the genetic quality of your mate will determine half the genetic quality of your offspring. Ugly, unhealthy mates usually lead to ugly, unhealthy offspring. By forming a joint genetic venture with an attractive, high quality mate, one's genes are much more likely to be passed on. Mate choice is simply the best eugenics and genetic screening that female animals are capable of carrying out under field conditions, with no equipment other than their senses and their brains.

Often, sexual selection through mate choice can lead to spectacular results: the bowerbird's elaborate nest, the riflebird's riveting dance, the nightingale's haunting song and the peacock's iridescent tail, for example. Such features are complex adaptations that evolved through mate choice, to function both as advertisements of the male's health and as aesthetic displays that excite female senses. One can recognise these courtship displays by certain biological criteria: they are expensive to produce and hard to maintain, they have survival costs but reproductive benefits, they are loud, bright, rhythmic, complex and creative to stimulate the senses, they occur more often after reproductive maturity, more often during the breeding season, more often in males than females, and more often when potential mates are present. Also, they tend to evolve according to unpredictable fashion cycles that change the detailed structure and content of the displays while maintaining their complexity, extremity and cost. By these criteria, most human

behaviours that we call cultural, ideological and political would count as courtship displays.

Victorian sceptics objected to Darwin's theory of sexual selection by pointing out that in contemporary European society, women tended to display more physical ornamentation than men, contrary to the men-display-more hypothesis. This is true only if courtship display is artificially restricted to physical artefacts worn on the body.

Whereas Victorian women ornamented themselves with mere jewellery and clothing, men ornamented themselves with the books they wrote, pictures they painted, symphonies they composed, country estates they bought, honours they won, and vast political and economic empires they built.

Although Darwin presented overwhelming evidence for his ingenious sexual selection theory, it fell into disrepute for over a century. Even Alfred Russell Wallace, the co-discoverer of natural selection, preferred to view male ornaments as outlets for a surplus of male energy rather than adaptations evolved through female choice. Even now, we hear echoes of Wallace's fallacious surplus-of-energy argument in most psychological and anthropological theories about the 'self-expressive' functions of human art, music, language and culture. The modern synthesis of Mendelian genetics and Darwinism in the 1930s continued to reject female choice, assuming that sexual ornaments simply intimidate other males or keep animals from mating with the wrong species. Only in the 1980s, with a confluence of support from mathematical models, computer simulations and experiments in animal and human mate choice, has Darwin's sexual selection theory been reestablished as a major part of evolutionary biology. Unfortunately, almost everything written about the evolutionary origins of the human mind, language, culture, ideology and politics has ignored the power of sexual selection through mate choice as a force that creates exactly these sorts of elaborate display behaviours.

The hypothesis

Humans are ideological animals. We show strong motivations and incredible capacities to learn, create, recombine and disseminate ideas. Despite the evidence that the systems which process ideas are complex biological adaptations that must have evolved through Darwinian selection, even the most ardent modern Darwinians such as Stephen Jay Gould, Richard Dawkins and Dan Dennett tend to treat culture as an evolutionary arena separate from biology. One reason for this failure of nerve is that it is so difficult to think of any form of natural selection that would favour such extreme, costly and obsessive ideological behaviour. Until the last 40,000 years of human evolution, the pace of

technological and social change was so slow that it's hard to believe there was much of a survival payoff to becoming such an ideological animal. My hypothesis, developed in a long PhD dissertation, several recent papers and a forthcoming book, is that the payoffs to ideological behaviour were largely reproductive. The heritable mental capacities that underpin human language, culture, music, art and myth-making evolved through sexual selection operating on both men and women through mutual mate choice. Whatever technological benefits those capacities happen to have produced in recent centuries are unanticipated side-effects of adaptations originally designed for courtship.

'The selection pressures that shaped the evolution of the human mind came increasingly from other minds testing whether one's ideas were interesting enough to provoke some sexual attraction'

Language, of course, is the key to ideological display. Whereas songbirds can only toy with protean combinations of pitch, rhythm and timbre, language gives humans the closest thing to telepathy in nature: the ability to transmit complex ideas from one head to another through the tricks of syntax and semantics. Language opens a window into other minds, expanding the arena of courtship display from the physical to the conceptual. This has enormous implications for the way that sexual selection worked during the last few hundred thousand years of human evolution. As human courtship relied more heavily on language, mate choice focused more on the ideas that language expresses. The selection pressures that shaped the evolution of the human mind came increasingly not from the environment testing whether one's hunting skills were sufficient for survival, but from other minds testing whether one's ideas were interesting enough to provoke some sexual attraction. Every ancestor of every human living today was successful in attracting someone to mate with them. Conversely, the millions of hominids and early humans who were too dull and uninspiring to become our ancestors carried genes for brains that were not as

ideologically expressive as ours. A wonderful effect of this runaway sexual selection was that brain size in our lineage has tripled over the last two million years, giving us biologically unprecedented capacities for creative thought, astonishing expressiveness and intricate culture. A more problematic effect is that our ideological capacities were under selection to be novel, interesting and entertaining to other idea infested minds, not to accurately represent the external world or their own transient and tangential place in it. This general argument applies to many domains of human behaviour and culture, but for the remainder of the paper, I will focus on political ideology.

The predictions and implications

The vast majority of people in modern societies have almost no political power, yet have strong political convictions that they broadcast insistently, frequently and loudly when social conditions are right. This behaviour is puzzling to economists, who see clear time and energy costs to ideological behaviour, but little political benefit to the individual. My point is that the individual benefits of expressing political ideology are usually not political at all, but social and sexual. As such, political ideology is under strong social and sexual constraints that make little sense to political theorists and policy experts. This simple idea may solve a number of old puzzles in political psychology. Why do hundreds of questionnaires show that men are more conservative, more authoritarian, more rights oriented and less empathy oriented than women? Why do people become more conservative as the move from young adulthood to middle age? Why do more men than women run for political office? Why are most ideological revolutions initiated by young single men?

> 'Once a sufficient number of students decided that attitudes towards apartheid were the acid test for whether one's heart was in the right place, it became impossible for anyone else to be apathetic about apartheid'

None of these phenomena make sense if political ideology is a rational reflection of political self-interest. In political, economic and psychological terms, everyone has equally strong self-interests so everyone should produce equal amounts of ideological behaviour if that behaviour functions to advance political self-interest. However, we know from sexual selection theory that not everyone has equally strong reproductive interests. Males have much more to gain from each act of intercourse than females because, by definition, they invest less in each gamete. Young males should be especially riskseeking in their reproductive behaviour, because they have the most to win and the least to lose from risky courtship behaviour – such as becoming a political revolutionary. These predictions are obvious to any sexual selection theorist. Less obvious are the ways in which political ideology is used to advertise different aspects of one's personality across the lifespan.

In unpublished studies I ran at Stanford University with Felicia Pratto, we found that university students tend to treat each others' political orientations as proxies for personality traits. Conservatism is simply read off as indicating an ambitious, self-interested personality who will excel at protecting and provisioning his or her mate. Liberalism is read as indicating a caring, empathetic personality who will excel at child care and relationship building. Given the well documented, cross-culturally universal sex difference in human mate choice criteria, with men favouring younger, fertile women and women favouring older, higher status, richer men (see Buss elsewhere in the *Quarterly*), the expression of more liberal ideologies by women and more conservative ideologies by men is not surprising. Men use political conservatism to (unconsciously) advertise their likely social and economic dominance; women use political liberalism to advertise their nurturing abilities. The shift from liberal youth to conservative middle age reflects a mating-relevant increase in social dominance and earnings power, not just a rational shift in one's self-interest.

More subtly, because mating is a social game in which the attractiveness of a behaviour depends on how many other people are already producing it, political ideology evolves under the unstable dynamics of game theory, not as a process of simple optimisation given a set of

'A more problematic effect is that our ideological capacities were under selection to be novel, interesting and entertaining to other idea infested minds, not to accurately represent the external world or their own transient and tangential place in it'

self-interests. This explains why an entire student body at an American university can suddenly act as if they care deeply about the political fate of a country they virtually ignored the year before. The courtship arena simply shifted capriciously from one political issue to another, but once a sufficient number of students decided that attitudes towards apartheid were the acid test for whether one's heart was in the right place, it became impossible for anyone else to be apathetic about apartheid. This is called frequency-dependent selection in biology and it is a hallmark of sexual selection processes.

What can policy analysts do, if most people treat political ideas as courtship displays that reveal the proponent's personality traits, rather than as rational suggestions for improving the world? The pragmatic, not to say cynical, solution is to work with the evolved grain of the human mind by recognising that people respond to policy ideas first as big-brained, idea infested, hypersexual primates, and only secondly as concerned citizens in a modern polity. This view will not surprise political pollsters, spin doctors, and speech writers, who make their daily living by exploiting our lust for ideology, but it may surprise social scientists who take a more rationalistic view of human nature. Fortunately, sexual selection was not the only force to shape our minds. Other forms of social selection such as kin selection, reciprocal altruism and even group selection seem to have favoured some instincts for political rationality and consensual egalitarianism. Without the sexual selection, we would never have become such colourful ideological animals. But without the other forms of social selection, we would have little hope of bringing our sexily protean ideologies into congruence with reality.

Vital attraction

David M Buss

Women and men have faced different adaptive challenges. Not surprisingly, they play the mating game by very different rules.

Few things are more obvious than the fact that human mating is not random. Some individuals are desired, others shunned. Standard lore in the social sciences has long held that human mating is highly culture specific – the qualities desired in one culture might be shunned in another and treated with indifference in a third. However, research by evolutionary psychologists over the past decade has demonstrated that this view of human mating is profoundly wrong.

More than a century ago, Charles Darwin offered a revolutionary explanation for some key mysteries of mating.[1] He had become intrigued by the puzzling developments in animals of characteristics that would appear to impair their chances of survival, such as elaborate plumage, large antlers and heavy horns. Darwin's answer was that these displays evolved because they led to reproductive success via mating advantage – a process he termed 'sexual selection'.

Sexual selection, according to Darwin, takes two forms. In one, members of the same sex compete with one another and the outcome

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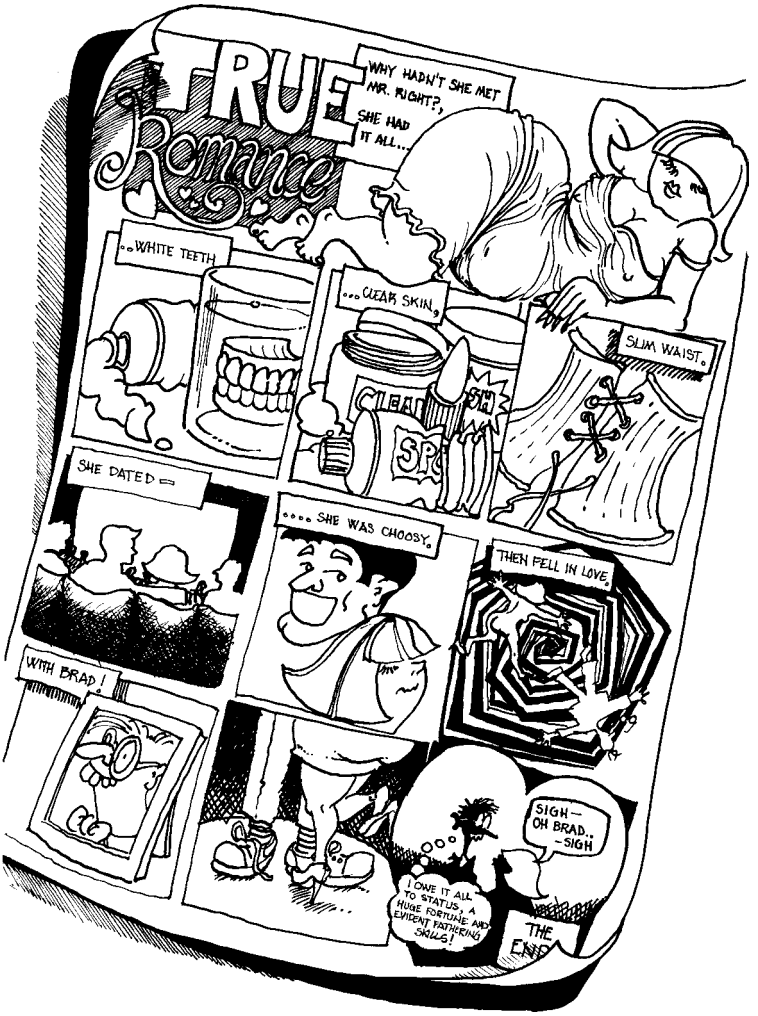
of their contests gives the winners greater sexual access to members of the opposite sex. Two stags locking horns in combat is the prototypical image of same sex competition. The characteristics that lead to success in these contests, such as greater strength, dexterity or even social intelligence, can evolve or increase in frequency over time simply because the victors are able to mate more often and hence increase their genetic representation in future generations over the losers.

'In one study, seventyfive per cent of men agreed to have sex with an attractive woman they'd never met before, but only fifty per cent agreed to a date'

In the other type of sexual selection, members of one sex choose a mate based on their preferences for particular qualities. If there is consensus about the desired qualities, those of the opposite sex possessing these qualities will be selected more often as mates. Those lacking consensually desired qualities will be excluded from mating and their genes will perish. Over generations, this form of sexual selection will produce an evolutionary change – an increase in the frequency of the desired traits and a decrease in the frequency of undesired traits, assuming that they are partly heritable.

'Male sexual jealousy has been hypothesised to be an evolved solution to the problem of uncertainty in paternity'

It is now known that evolution by selection mathematically reduces to differential gene replication by virtue of differences in the organisms that the genes give rise to.[2] In this sense, sexual selection does not represent a form of selection distinct from natural selection. Nonetheless, many biologists prefer to retain the distinction for heuristic reasons, because sexual selection highlights particular causal paths through which differential gene replication is achieved.



Two key questions, then, are what are the desires of each sex for mates of the opposite sex, and to what degree is there a consensus about these desired qualities? When I began work on this topic in the early 1980s, little concrete knowledge was available. There was a frustrating lack of scientific evidence on mating in human populations and

practically no documented support for grand evolutionary theorising about humans. Noone knew whether some mating desires are universal, certain sex differences are characteristic of all people in all cultures, or if cultural variables exert such a powerful influence as to override any evolved preferences that might happen to be there.

So I departed from the traditional path of mainstream psychology to explore whether predictions about mate preferences could be anchored in Darwin's theory of sexual selection.

Predicting human mating strategies

Evolutionary psychological thinking yields a guiding framework for when to expect similarities or differences between the sexes. Men and women are predicted to differ only in domains where they have recurrently faced different adaptive problems over the long course of human evolutionary history. In all other domains, where the sexes have confronted similar adaptive problems, they are predicted to exhibit similarity in their underlying psychology. The two sexes have faced similar problems of thermal regulation, for example, and so show similarities in their sweat glands and shivering mechanisms. On the other hand, women, but not men, have faced the adaptive problem of giving birth, and so women have evolved a host of physiological mechanisms absent in men, such as a cervix that dilates ten centimetres just prior to giving birth, that aids in the solution to this adaptive problem.

In the realm of mate selection, several features of human reproductive biology are markedly sex differentiated. Fertilisation, gestation and placentation, for example, occur internally within women, but not within men. This means the sexes differ in obligatory parental investment – the amount of effort that must be invested to produce a child. Women must invest nine months of internal gestation, which is costly metabolically. In order to produce that same child, the minimum obligatory investment by a man is a mere act of sexual intercourse. Men can and do invest more than the minimum, of course, but the sharp sex difference in obligatory parental investment creates different adaptive problems for the sexes.

According to Robert Trivers' theory of parental investment and sexual selection,[3] several predictions follow from these sexual asymmetries in obligatory parental investment. First, errors in the selection of a mate are more costly for women than for men. Sexual selection theory predicts that the higher investing sex should impose more stringent preferences in choosing mates. Therefore, women should generally be more choosy or discriminating about their selection of mates. Second, men are predicted to be more competitive with one another for sexual access to the high investing women, as a man's reproductive success was largely the product of the number of women he could successfully inseminate and fertilise. Therefore, men are predicted to have evolved psychological mechanisms different from those of choosy women. They should show greater competitiveness for sexual access, lower standards in selecting short-term mates and a greater desire for sexual variety.

Nevertheless, when both sexes invest heavily in offspring, both sexes are predicted to be highly discriminating in their choice of a mate. And this provides a key insight into the evolution of human mating strategies – the distinction between short-term mating (casual sex) and long-term mating (marriage or cohabitation).[4]

So in long-term mating, what does an evolutionary perspective predict about sex differences? First, it suggests that women will select men based on cues to their ability and willingness to invest in them and their children. Men lacking resources should be shunned. And men with resources but displaying a short-term sexual strategy, and hence low willingness to invest, should also be shunned. Second, it predicts that men will have evolved preferences for women who embody cues to high reproductive potential. Since reproductive potential in women declines rapidly with age from seventeen onwards, men are predicted to desire those women who display cues to youth which are largely conveyed by physical appearance (smooth skin, white teeth, firm muscle tone, lustrous hair, symmetrical features, full lips). Reproductive potential is also conveyed by cues to health, and again, physical appearance provides a bounty of relevant indicators.

In short, there are two sets of predictions about sex differences in long-term mate preferences. Women, more than men, should desire cues

to a potential mate's resources and his willingness to commit them to her. Men, more than women, should desire cues to a potential mate's reproductive potential such as youth, health and physical attractiveness. Furthermore, there is a stringent test of these scientific predictions: the sex differences in evolved desires should be universal and therefore found in every culture.

Universals in sex appeal

Over a five year period, I conducted an international study to test these evolutionary predictions.[5] I started with a few European cultures, such as the Netherlands and Germany, but by sharing many features of Western civilisation that did not provide the most rigorous tests. So I expanded the study to include fifty research collaborators, mostly native residents of thirty-seven different cultures located on six continents and five islands, from Australia to Zambia. Local residents of each culture administered the questionnaire about mating desires in the native language. We sampled large urban cities, such as Rio de Janeiro and Sao Paulo in Brazil, Shanghai in China, Bangalore and Amadebad in India, Jerusalem and Tel Aviv in Israel, Tehran in Iran, and Lagos and Kana in Nigeria. We also sampled rural peoples, such as Gujarati Indians and the South African Zulus. We covered the educated and the less educated. We included every age from fourteen to seventy, as well as the entire range of political systems from capitalist and communist to socialist. All major racial groups, religious groups and ethnic groups were represented.

What women desire

As predicted, women universally desire men with good financial prospects. A sample of these findings is shown in Figure 1. Across all thirty-seven cultures, women place a greater premium on a man's income than men do on a woman's income.

Women also tend to desire characteristics in men that lead to resources over time. Thus, women in most cultures place a premium on a man's social status, his ambition and industriousness, and his

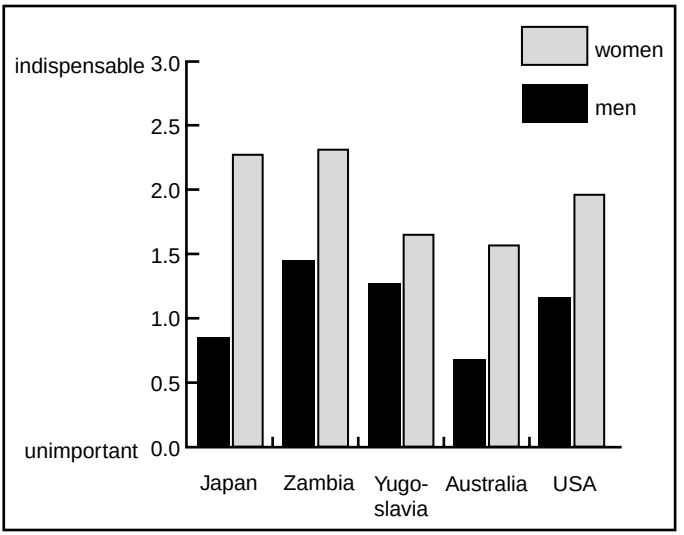


Figure 1 Good financial prospects.

older age – qualities known to be linked with resource acquisition. These sex differences have subsequently been replicated by independent investigators in a number of other cultures, such as the Herero in Botswana and the Ache in Paraguay.

What men desire

The study of thirty-seven cultures found only two qualities that men universally desired more than women – relative youth and physical attractiveness. A sample of these findings is shown in Figures 2 and 3. Men generally desired wives who were three years younger than they were, although this preference varied somewhat from culture to culture. In polygymous cultures such as Zambia and Nigeria, where men are permitted to take multiple wives, men desire partners who are seven or eight years younger, perhaps reflecting the fact that men in such cultures are generally older before they possess the resources needed to attract wives. Not a single culture showed men preferring

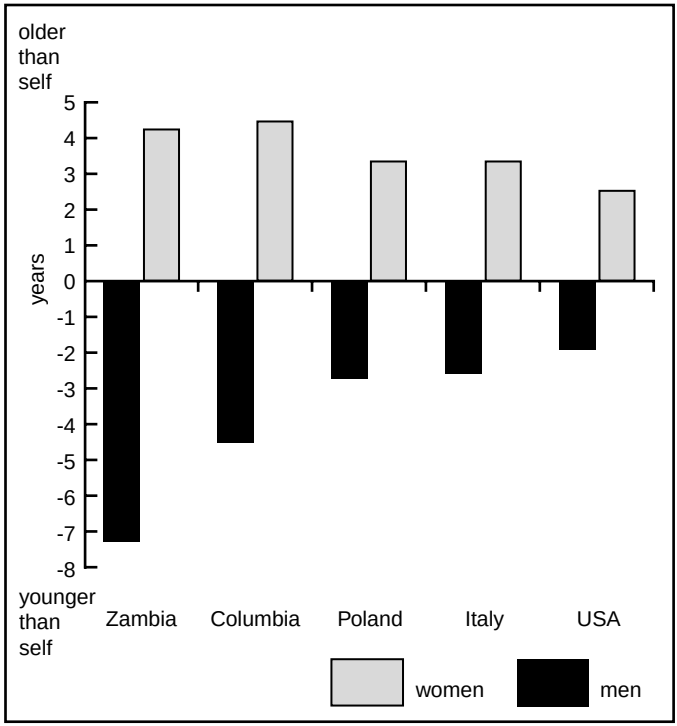


Figure 2 Age difference preferred between self and spouse.

wives older than themselves, suggesting that men's desire for relative youth is a human universal. These findings support the prediction that men have evolved preferences for cues to a woman's reproductive potential.

Similar results occur for men's desire for physically attractive mates, as shown in Figure 3. Although for decades the conventional wisdom in social science was that standards of beauty are entirely arbitrary and culture bound, there is now a sizeable body of evidence demonstrating that standards of physical attractiveness are universal and embody cues to reproductive potential. Specifically, what men find attractive are cues such as smooth, clear skin, a youthful appearance, a waist that

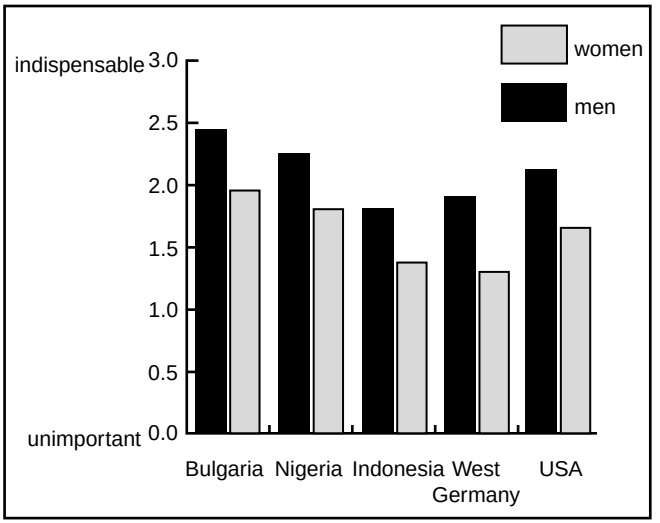


Figure 3 Physical attractiveness.

is small relative to the hips (this signals fertility), and symmetrical features, which signal both health and youth. Thus, the premium men place on physical attractiveness is a proxy for youth and health, and hence high reproductive potential.[6]

Appetites for sexual variety

A straightforward prediction from the theory of parental investment is that men should have evolved psychological mechanisms that promote short-term mating.[7] Over human evolutionary history, the reproductive advantages to men of increasing their sexual access to women would have been fairly direct. A married man with two children, for example, could increase his reproduction by a full fifty per cent from a brief affair that resulted in successful fertilization. A woman, in contrast, can fulfil her reproductive potential with one man alone; she has no incentive to take on additional partners unless there is a reward such as better genes or access to increased resources.

A number of specific psychological mechanisms have been proposed as adaptive solutions to the problem of gaining access to a variety of sex partners – a desire for sexual variety, a reduction in standards for a short-term mate, sensitivity to cues of women's sexual availability or accessibility, and so on.

Dozens of studies have confirmed the existence of large sex differences in the desire for sexual variety. When asked how many sex partners one would ideally like to have over the next couple of years, men reported eight on average, whereas women reported one or two. Men report having more frequent sexual fantasies than women report. Men's sexual fantasies more often involve the switching of partners during the course of a single fantasy episode.

In one study on a college campus,[8] students were approached by an attractive stranger of the opposite sex ('hi, I've noticed you around town lately, and I find you very attractive') and asked one of three questions: 'would you go out on a date with me tonight?', 'would you go back to my apartment with me tonight?', or 'would you have sex with me tonight?'. Of the women approached by an attractive man, fifty per cent agreed to the date, six per cent to go back to his apartment, and nought per cent to have sex with him. Of the men approached, on the other hand, fifty per cent agreed to date the attractive woman, sixty-nine per cent to go back to her apartment, and seventy-five percent to have sex with her.

These findings represent merely a small sampling of findings from hundreds of studies that have been conducted, all confirming that men, on average, have a greater desire for sexual variety than do women – a straightforward prediction from the theory of parental investment and sexual selection.

Sex differences in jealousy

Because fertilisation occurs internally within women, ancestral men faced an adaptive problem not faced by ancestral women – uncertainty in whether they were the parents of their putative children. Male sexual jealousy has been hypothesised to be an evolved solution to the

problem of uncertainty in paternity. Men's jealousy, on this account, should focus heavily on cues to a partner's sexual infidelity, since that is what would have compromised certainty of paternity.

From an ancestral woman's perspective, a mate's sexual infidelity, by itself, would not compromise her certainty in maternity. However, a man's infidelity could be extraordinarily costly for the women to the degree that it signalled the diversion of the man's commitment, investment and resources, all of which might get channelled to a rival woman and her children. For these reasons, the theory predicts that women's jealousy should focus on cues that signal the long-term diversion of these resources, such as her man's emotional (not solely sexual) involvement with another women.

'if you are a woman, the odds are eighty-five per cent that you would say emotional infidelity would disturb you more than sexual infidelity'

Consider this question – what would upset or anger you more: a) imagining your romantic partner having sexual intercourse with another person, or b) imagining your romantic partner becoming emotionally involved with another person? If you are a woman, the odds are eighty-five per cent that you would say that the emotional infidelity would disturb you more. If you are a man, however, the odds are only forty per cent that the emotional infidelity would disturb you more. Clearly, both forms of infidelity are upsetting to both men and women. However, there is a large and replicable sex difference in reactions to this dilemma, with far more men than women reporting being upset by the sexual infidelity, and far more women than men reporting being upset by the emotional infidelity.

These findings have been replicated in several cultures, such as North America, Germany, the Netherlands, Korea and Japan.[9] The sex differences are also replicated when physiological recording methods are used to gauge distress. Thus, when asked to imagine a partner having sexual intercourse with someone else, indices of physiological

distress – heart rate, electrodermal activity (skin conductance) and electromyographic activity (frowning as gauged by corrugator contraction in the brow region of the forehead) – all showed more elevated responses in men than in women. Women, in contrast, showed more physiological distress when imagining a partner's emotional infidelity.

In short, the predicted sex differences in jealousy have been confirmed in humans in a variety of cultures and employing a variety of scientific methods. The differences correspond to sex differences in the adaptive problems men and women confronted over the long expanse of human evolutionary history – paternity uncertainty for men and resource diversion for women.

Conclusions

Strong sex differences occur reliably in domains closely linked with sex and mating, precisely as predicted by psychological theories based on sexual selection. Within these domains, the patterns of psychological sex map precisely onto the different adaptive problems faced by men and women over the course of human evolutionary history. The evolutionary models thus have heuristic and predictive power.

The evolutionary psychology perspective also offers several insights into broader questions about sex differences. First, evolutionary psychology has not only led to the discovery of several universal sex differences that were not discovered within mainstream social science, it also provides powerful explanations for why these sex differences exist.

Second, neither women nor men can be considered to be superior or inferior to the other, any more than a bird's wings can be considered superior or inferior to a fish's fins or a kangaroo's legs. Each sex possesses mechanisms designed to deal with its own adaptive challenges – some similar and some different. So from the vantage point of evolutionary psychology, notions of superiority or inferiority are incoherent. The meta-theory of evolutionary psychology is descriptive, not prescriptive – it carries not values in its teeth.

Third, this perspective offers an overarching framework for understanding sex differences and sexual similarities. No other theory in the

social sciences has been capable of predicting and explaining the large number of precise, detailed, regular sex differences revealed by research guided by evolutionary psychology.

Those grappling with the existence and implications of psychological sex differences cannot afford to ignore their evolutionary origins.

Theory: the adaptationist programme in biology

Don Symons

The goal of the adaptationist programme is to recognise certain features of organisms as components of some special problem-solving machinery. These problem-solving mechanisms are called adaptations. The identification and description of adaptations has always been the core of biological investigation, because that is how organisms are partitioned into non-arbitrary, scientifically functional components.

That organisms are integrated bundles of problem-solving devices has been understood for centuries – thus the adaptationist programme long preceded Charles Darwin. As the evolutionary biologist Ernst Mayr has pointed out, the adaptationist question 'what is the function of a given structure or organ?' has been the basis for every advance in physiology. William Harvey's discovery that the heart is a pump, for example, was a signal contribution to the adaptationist programme. In fact, adaptationism pervades every level of biological inquiry – molecular, cellular, tissue, organ and whole organism – because, at every level, descriptions of relevant phenomena are almost always, at least implicitly, functional descriptions.

Charles Darwin's contribution to the adaptationist programme was to provide the first and only scientifically coherent account of the origin and maintenance of adaptations – evolution by selection. This process couples random variation in the hereditary material with non –

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random replication of the variants. It produces and maintains hearts, eyes, lymphocytes, edge-detecting cells in the visual cortex – all the complex machinery of life. To propose that a particular trait is an adaptation is not merely to propose that the trait evolved, but that it was designed by natural selection to serve some function.

It is logically impossible to describe an adaptation in functional terms without describing the environmental features to which the adaptation is adapted. Thus specific assumptions about the past are implicit in every description of an adaptation whether or not that description explicitly mentions adaptation, function, evolution, natural selection, ancestral populations or past environments. And the features of past environments to which the adaptation is adapted may not exist in the present.

Theory: the human mind must comprise many specialised modules

Don Symons

Every organism, including a human being, is an integrated bundle of problem-solving devices. A device that is well-designed to solve one kind of adaptive problem almost inevitably will be poorly designed to solve any other. Hence adaptations overwhelmingly tend to be specialised and domain-specific. That is why there is no such thing as a general purpose bodily organ. Humans possess both a heart and a womb, for example, because the design features that make the heart effective for pumping blood make it ineffective for protecting and nourishing an embryo, and vice versa. There is no such thing as a general problem solver because there is no such thing as a general problem.

This argument applies with equal force to psychological adaptations, or 'mental organs'. Because our hunter-gatherer ancestors were faced with many different kinds of information-processing problems – choosing mates, forming coalitions, finding food, selecting habitats and so forth – each of which required its own distinctive kind of solution, the human brain must comprise a very large number of complex adaptations specialised for solving diverse problems in different domains. The psychological mechanisms that underpin food choice, for example, are exceedingly unlikely to be identical to those that underpin mate choice, if only because the criteria that determined food value were utterly different from those that determined mate value.

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When social scientists and others propose that sex differences in human feeling, thought and action are the products of culture, society, scripts, roles, socialisation and the like, they imply that, however it is that males and females come to differ, they do it with essentially identical brain mechanisms.

Proponents of such notions as cultural construction seem to believe that, in the absence of conclusive evidence to the contrary from the neurosciences, it is reasonable, prudent and parsimonious to assume that male and female brains are essentially identical. In other words, most social scientists treat the hypothesis that male and female brains are fundamentally different as if it were extraordinary – like the hypothesis that people can bend spoons with the unaided power of their minds – and required extraordinary evidence to be accepted. But to the adaptationist, the precise opposite is reasonable, prudent and parsimonious. From the perspective of the adaptationist program, the chance that human male and female brains are essentially identical is effectively zero.

Theory: perceived beauty the world over

Don Symons

On January 23, 1996, the *Los Angeles Times* carried a long article about Asian American women who have had surgery on their upper eyelids to create a crease between the eyebrow and lashes and to enlarge the eyes. Most of the people interviewed for the article explained the popularity of this surgery with such concepts as self-hatred, internalised racism, Western ideals of beauty and so forth, with no evidence whatever presented to support any of these hypotheses, and no sign that their proponents thought that any evidence was required. A few people with contrary views were quoted in the article, however – and they invariably cited supporting evidence. A plastic surgeon who performs these operations denied that their goal is to make women look less Asian, pointing out that only the eyes are altered. The women are not attempting to look more Western in any other respect. In the *Times*' letters column on February 4, 1996, a writer noted that some Asians (15 per cent) naturally have folds in their eyelids and that the surgery does not produce eyelids that are outside the Asian range. This writer stated that women have the surgery to look more attractive, not to look more Western.

Noone, however, pointed out that it is common for Western women to have surgery on their eyes, the purpose of such surgery being almost

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always to make the eyes look younger and, frequently, larger. Similarly, many women of every race use cosmetics to create the optical illusion that their eyes are larger than they are, because this enhances women's appearance. I have proposed elsewhere that relatively large eyes increase female facial attractiveness because they make a woman's lower face look smaller by comparison, just as shoulder pads make a woman's waist look smaller, and that this is perceived as attractive universally.

Notes

1. Darwin C, *The descent of man and selection in relation to sex*, Murray, London 1871.
2. Hamilton WD, The genetical evolution of social behaviour in *Journal of theoretical biology* 1964; vol 7, pp 1–16, 17–52.
3. Trivers R, Parental investment and sexual selection in Campbell B (ed), *Sexual selection and the descent of man*, Aldine de Gruyter, New York 1972, pp 136–79.
4. Symons D, *The evolution of human sexuality*, Oxford University Press, New York 1979.
5. Buss DM, *The evolution of desire: strategies of human mating*, Basic Books, New York 1994.
6. Symons D, Beauty is in the adaptations of the beholder: the evolutionary psychology of female sexual attractiveness in Abramson PR and Pinkerton SD (eds), *Sexual nature, sexual culture*, University of Chicago Press, Chicago 1995; pp 80–118.
7. Buss D Mand Schmitt DP, Sexual strategies theory: an evolutionary perspective on human mating in *Psychological review* 1993; vol 100, pp 204–32.
8. Clark R and Hatfield E, Gender differences in receptivity to sexual offers in *Journal of psychology and human sexuality* 1989; vol 2, pp 39–55.
9. Buunk PB, Angleitner A, Oubaid Vand Buss DM, Sex differences in jealousy in evolutionary and cultural perspective: tests from the Netherlands, Germany and the United States in *Psychological science* 1996.

The dissent of woman

Robert Wright

What feminists can learn from Darwinism.

History has not been kind to ideologies that rested on patently false beliefs about human nature. Communism, for example, isn't looking very robust these days. From the beginning, communists held that human selfishness, the great crippler of communal utopias, was eradicable. They shaped scientific theory accordingly. Marx insisted that traits acquired through education – a more generous disposition, say – were biologically inherited by offspring. Up until 1964, long after Western geneticists had dismissed this idea, it was still an official doctrine of Soviet biology. Occasionally, Soviet geneticists who denied the doctrine were sent to prison. It would be melodramatic to say that today feminism is where communism was at mid-century. However, it's tempting. Once again, an ideology clings to a doctrine that, for better or worse, isn't true – in this case the flaw lies in the idea that gender is essentially

'So while Tavris is in one sense right to say the myth of the coy female is dead, she is exactly wrong to imply that this means women aren't by nature more sexually reserved than men'

Senior editor, *The new republic* and author of *The moral animal.*

a construct, that male and female nature are inherently more or less identical. The falseness of the doctrine is increasingly evident and its adherents can admit as much only at some risk, if not of imprisonment, then of an extremely chilly reception from fellow feminists.

Of course, there are the 'difference feminists'. But even they don't profess to believing that men and women are inherently different. They either stay silent on the question of where the differences come from or trace them to early social influences.

There has been much talk about the fragmentation of modern feminism. In addition to the difference feminists (eg psychologist Carol Gilligan, linguist Deborah Tannen), there are the radical feminists (eg Catharine MacKinnon, Andrea Dworkin), the liberal equity feminists (eg Supreme Court Justice Ruth Bader Ginsburg, writer Katha Pollitt) and assorted others. But, as diverse as these thinkers seem, they are bound by a common thread: none is interested in the well-grounded study of human nature.

By well-grounded study of human nature I mean grounded in comprehension of the process that designed human beings – natural selection. Specifically, the field of inquiry that I commend to feminists, and that they seem loath to explore, is this science called evolutionary psychology. Evolutionary psychology sees some clear differences between the male and female minds, but differences which aren't wholly immutable. The difference feminists are right to sense that culture matters; we are a pretty plastic species. Still, many of the differences between men and women are more stubborn than most feminists would like, and complicate the quest for – even the definition of – social equality between the sexes.

The feminist aversion to the Darwinian study of difference has as much to do with Darwinism as with difference. After all, Darwinism has traditionally been most potently wielded by the right wing. Feminists fear that it will again be used to justify oppression as natural, as in our genes and beyond our control. That's certainly a danger, but it's not inevitable or necessarily worse than the alternative danger that feminism, like communism, will falter under the weight of its doctrinal absurdities. That the laudable ideals it started with, rather than

reaching a gritty compromise with reality, will begin to wither for lack of honest support.

It would be misleading to say that feminists casually disregard Darwinism. A fair amount of effort goes into the disregard. A few feminists have actually studied and then dismissed the Darwinian view of human nature. Unfortunately, they seem to have expended more energy on the dismissal than on the study.

A typical dismissal begins by mocking Darwin's observation that in species after species, 'the differences between the sexes follow almost exactly the same rules. The males are almost always the wooers …' The female, 'with the rarest exception, is less eager than the male … She is coy … The exertion of some choice on the part of the female seems almost as general a law as the eagerness of the male'. This is a vital observation, for the evolutionary logic behind it (which wasn't grasped until a century after Darwin) underlies many psychological differences between men and women.

'Some of the ugliest things about the world have biological roots. These include the male patriarchy that feminist radicals see everywhere they look, and men's attempts to control the sexuality of women'

Darwin's observation has been ridiculed by Carol Tavris in her much-praised (by feminists) book, *The mismeasure of woman*. Tavris calls it the myth of the coy female. The pattern Darwin thought he saw, she asserts, isn't really there. We can no longer explain sex roles by 'appealing to the universality of such behaviour in other species' because 'other species aren't cooperating.'

Actually, they are. To be sure, there are many species whose females are less than devoutly monogamous. There are even species whose females are as sexually assertive as males, or more so. What Tavris doesn't seem to appreciate is how all this variety can specifically reinforce our belief that the general rule of relative female sexual reserve has a genetic basis.

'It may be natural when men with a manifest inability to legitimately obtain a mate resort to sex with aggression. Hence the profile of the typical rapist – he lacks the material and personal resources to attract women'

To see this crucial point, you have to first see the modern Darwinian explanation for that reserve. A female can reproduce much less often than a male, because she is stuck with the time-sapping job of birthing and maybe even rearing the young. Thus it makes Darwinian sense for her to appraise carefully the quality of aspiring mates – both their genetic quality and, in species with high male parental investment such as ours, their ability and willingness to help provide for the young after birth. This quality control helps keep the female from wasting one of her rare and arduous reproductive episodes creating offspring with poor survival prospects. (A woman needn't think about these things. Rather, her genetically based impulses of attraction have been shaped by this logic over millions of years.)

For a male, in contrast, reproduction can be a frequent and low cost affair. The more sex partners, the more chances he has to get genes into the next generation. Hence the massively documented fact that males in our species, when sizing up sheerly sexual (not marital) opportunities, are on average less choosy than females.

As it happens, there are a few eccentric sex-reversed species in which the males assume much of the burden of giving birth. Male sea horses have an incubation pouch in which the female deposits the eggs. Male phalaropes (sea snipes) sit in the nest and incubate the eggs, taking themselves out of commission and leaving their mates free to embark on another round of reproduction. And these are the species in which stereotypes of courtship behaviour most reliably break down – female sea horses and phalaropes are quite sexually assertive. Thus these ostensible exceptions to Darwinian logic comply with and bolster it. They are further evidence that the sex that can reproduce more often will typically be the randier sex.

The feminist Anne Fausto-Sterling, author of *Myths of gender*, is thus missing the point when she cites the phalaropes, with their reversed sex roles, and says sarcastically, 'You name your animal species and make your political point.' You name your animal species and it complies with evolutionary theory. Politics will have to adjust accordingly.

It turns out that females in our species are not, by nature, utterly coy or monogamous. There is physiological evidence that they are naturally prone to promiscuity and infidelity under some circumstances. But they are not nearly so prone as males. More to the point, figuring out how naturally adventurous women are, and why, has depended on careful study of various species whose females don't precisely fit the coy stereotype.

While Tavris is in one sense right to say the myth of the coy female is dead, she is exactly wrong to imply this means women aren't by nature more sexually reserved than men, or that recent zoology has sapped confidence in the Darwinian comprehension of the human

'This isn't to say men don't find loose women sexy. From a Darwinian standpoint, a loose woman just isn't the genetically optimal woman to fall in love with'

mind. For Tavris and Fausto-Sterling to note that the crudest stereotypes about human sex roles aren't found throughout the animal kingdom, and then end the discussion there, is to fail to adequately understand evolutionary biology. And these are the two most commonly cited feminist 'experts' on Darwinism.

I cannot, in the space of this article, try to convince sceptics that men are naturally less discriminating about sex partners than women. Instead, I would direct readers who seek deeper immersion in the arguments for modern Darwinism to various books, including Matt Ridley's *The red queen*, David Buss's *The evolution of desire* and my own *The moral animal*.

In lieu of persuasion, I'll mostly confine my assertions about human nature to beliefs that are widely accepted within evolutionary psychology – doctrines subscribed to by, among others, many female (and male) Darwinians who would call themselves feminists. Of course, detached from the larger body of cross-cultural and cross-species evidence in which they're embedded, all these claims will strike any determined sceptic as just-so stories. But do not excuse yourself from confronting them on the grounds that they are just tired Darwinian doctrines, scrutinised by feminists and judiciously rejected. There is not a single well-known feminist who has learned enough about modern Darwinism to pass judgment on it.

Some of them would be well advised to. Though it is simplistic to say that evolutionary psychology vindicates one feminist school or another, some schools could use the field to support at least part of their platform. At the same time, every school can find something in the field that threatens cherished beliefs. Most feminists should have a love-hate relationship with modern Darwinism.

Oddly, given Darwinism's confused association with the political right, evolutionary psychology lends support to some of the most

radical feminists such as MacKinnon and Dworkin. Both have been criticised for saying genuinely nutty things – such as Dworkin's the atrical suggestion that all heterosexual sex is rape – that defy all attempts at justification. But both have positions of more measured extremity that, if justified at all, are best done in Darwinian terms.

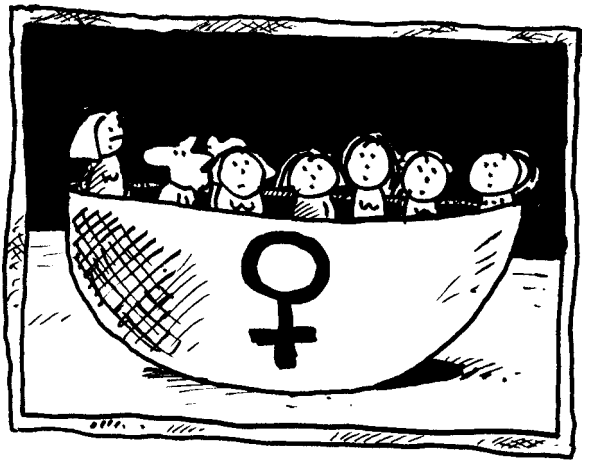
Consider sexual harassment. MacKinnon helped establish the 'hostile environment' test for harassment and defines such environments broadly. By her reckoning, two-thirds of working women have been harassed. Whereas some feminists consider the Anita Hill affair a borderline harassment case, MacKinnon jumped vehemently to Hill's defence.

I can see why. A man who held power over Hill was alleged to have made persistent sexual overtures. Naturally, Hill would feel great distress. But I can only take this view by thinking of Hill as a woman, with the kind of mind natural selection designed for women. A man might feel uncomfortable with a comparable undercurrent of sexual advance from a female boss, but it would be strange for him to feel deep distress.

> 'Human males are by nature oppressive, possessive, flesh-obsessed pigs. But they're not beyond cultural improvement, thanks to the fact that love, compassion, guilt, remorse and the conscience are evolved parts of the mind, just like lust and jealous rage'

Again, the logic goes back to the fact that, for women, reproductive opportunities are precious. During evolution it was costly (genetically) for a woman to have sex with a man she didn't want to have sex with – often a man who evidently had genes not conducive to viable and fertile offspring or had no evident inclination to stick around and help provide for the offspring. The abhorrence women feel at the prospect of sex with a man they find unattractive is an expression of this logic.

For men, the logic is different. Being coerced into sex with a woman wasn't an issue during evolution, since men can't have sex unless physiologically aroused and would have had no large ill effects. The worst



likely outcome for the man (in genetic terms) is that pregnancy would not ensue. There is no reason for evolution to have instilled in the male mind an aversion to coerced sex with women. So, yes, I'd say Anita Hill was sexually harassed. She was under coercive, if subtle, pressure to have sex. But that judgment depends on her mind being a female mind with female vulnerabilities. Many feminists, even without any help from Darwin, have discerned the tension here. The more protection you want to provide women, the harder it is to argue that they don't by their nature need special protection. The more often you see them victimised, the stronger the implication that they are by nature victims who are weaker than men. That is why some feminists resist MacKinnon's broader definitions of sexual harassment and rape, and her view of pornography as an assault on women. That is why she is called a 'victim' feminist – and not just by conservatives such as Christina Hoff Sommers, but by feminists further to the left, such as Naomi Wolf. Justice Ruth Bader Ginsburg, who as a liberal equity feminist professes to seek only equal treatment for women, remarked after hearing MacKinnon speak, 'That woman has bad karma'.

Yet the equity feminists have failed just as surely as MacKinnon to resolve the tension between protecting women and patronising them.

Consider the Supreme Court's unanimous ruling in the latest sexual harassment case. It concerned a woman at a forklift company and her creepy boss. He would joke about large breasts, ask female employees to fish through his pockets for coins and so on. The straw that broke the camel's back was his asking a subordinate if she had landed one of her accounts by meeting with the client at a Holiday Inn.

> 'For men, the logic is different. Being coerced into sex with a woman wasn't an issue during evolution. The worst likely outcome for the man (in genetic terms) is that pregnancy would not ensue'

Ruling in support of the female worker, the Supreme Court tried to sustain a broad definition of hostile environment. The victim, it said, needn't prove that she had been psychologically damaged, only that she might reasonably have found the comments hostile. But, in a bow to Ginsburg and the equity feminists, the Court cast its ruling in terms of a reasonable person, not a reasonable woman.

This simply won't wash. How does a 'reasonable person' feel about the implication that he or she closed a deal by sleeping with a customer? Well, the average woman feels quite insulted, and the average man feels somewhere between mildly insulted and quite flattered. She is being called a whore. He is being called a stud.

It is tempting to dismiss these value laden labels as the residue of centuries of patriarchy, or echoes of the Victorian Madonna-whore dichotomy – ephemeral cultural pathologies that the Court needn't stoop to accommodate. But there is another explanation: these moral judgments may have a genetic basis.

To begin with, men tend to find a history of extreme promiscuity an exceedingly undesirable feature in a wife, and this makes perfect Darwinian sense. The more promiscuous the wife, the less likely that the children in which the man invests his time and energy are in fact carrying his genes. In other words, genes inclining men to abhor promiscuous long-term mates would do better at getting into ensuing

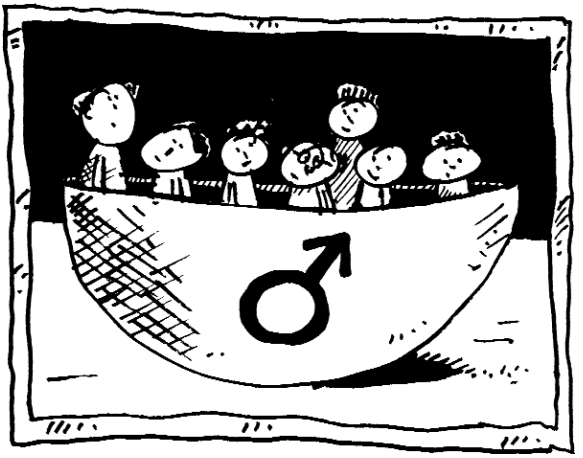
generations than less discriminating genes. The logic isn't the same for women, since the children they give birth to always carry their genes (at least they did during evolution – which is what counts).

This isn't to say men don't find loose women sexy. From a Darwinian standpoint, loose women are in some ways great sex partners because they're so easy to get – and for purposes of a man's genetic proliferation, the more gettable the woman, the better. It's just that a loose woman isn't the genetically optimal woman to fall in love with; investing in her children is ill advised.

Hence, it seems, the Madonna-whore distinction. Men appear to be designed by natural selection to feel merely lust for fast women but to feel love as well for (some) slower ones. They won't always insist on marrying a Madonna, virgins being scarce, and besides, the choice of a mate is a complex unconscious calculus full of trade-offs. Still, men do often draw a morally coloured distinction among their romantic prospects, viewing some kinds of women as full-fledged human beings, warranting extensive psychological exploration, and others as something more like pieces of meat. And one of various features that can put a woman in the latter camp is a reputation for extreme promiscuity. Men seldom admit this to either kind of woman, and some men don't admit it to themselves. But if you listen carefully to men talking to one another, the attitude is there.

It is not surprising, then, that the average woman resists being publicly labelled easy, regardless of her actual degree of promiscuity. During evolution, that label would have cut the chances of a man's investing in her offspring.

This idea of an inherent and morally charged male mental distinction between fast and slow women is just a theory. And, while it probably commands majority allegiance within evolutionary psychology, it is not as solidly established as, say, the idea of sex differences in promiscuity. Even more tentative is the idea that women have some natural aversion to accusations of extreme sexual looseness. Still, the closer we look at the evidence, the better things look for the theory. Various culturally deterministic anthropologists, notably Margaret Mead, claimed to have found exotic cultures in which women were as prone



to promiscuity as men and noone cared. These claims have collapsed upon reexamination. Mead's favourite example, Samoa, turns out to have featured a virtual male obsession with the virginity of mates. (In Samoan lore, as Derek Freeman noted in *Margaret Mead and Samoa*, a deflowered woman is called a 'wanton woman, like an empty shell exposed by the ebbing tide'. A song performed at defloration ceremonies went like this: 'All others have failed to achieve entry … Being first, he is foremost.

> 'When a woman has sex under a man's pretences of enduring affection and then he never calls again, the evolutionary source of her anguish is the same as for the anguish following rape'

All of this explains what for almost everyone is the common sense reaction to the forklift case, yet what few feminists will admit: the reason the remark about the Holiday Inn was offensive was because it was made to a woman. What evolutionary psychology suggests is that this relevance of gender to law is no fleeting creation of culture.

In the end, the problem with the Ginsburgian reasonable person formulation is not that it leads to a narrow definition of harassment, but that it leads to no definition at all. Asking what a reasonable person finds offensive is like asking what colour a typical fruit is. The answer depends on whether you're talking apples or oranges.

The general truth suggested here is that we can either give women broad protection against sexual harassment that is grounded specifically in an understanding of the female mind, or we can ignore sex differences and give women much less protection. Or we can do what the Supreme Court did: carefully craft tortured legal doctrines that defy both common sense and our emerging comprehension of human nature – doctrines that are unlikely to withstand the test of time.

'Tannen's overriding emphasis on culture would make more sense if she could point to a single one of the 1,200 societies on record and show women, on average, pursuing social status and political power as fiercely and opportunistically as the average man. She can't'

Evolutionary psychology's tendency to provide at least some support for radical feminism goes beyond sexual harassment. Dworkin's contention that 'dehumanisation is a basic part of the content of all pornography' is characteristically overstated, but in Darwinian light it looks far from crazy. Certainly most pornography rivets the whore, not the Madonna part of the male mind. The women in *Hustler* aren't women a man would want to marry. They're women whose appeal has nothing to do with getting to know them. Indeed, they're women who are exciting partly because they're portrayed as not demanding that he get to know them. They seen willing to be treated as meat, as optimally efficient sex objects.

To say that men objectify loose women isn't to say, alas, that men never see the lucky recipients of their lasting affection as objects. The male tendency to possessively guard mates against the advances of rivals may be more than mere metaphor. For men, 'the same mental

algorithms are apparently activated in the marital and mercantile spheres', write the evolutionary psychologists Martin Daly and Margo Wilson. Again, the reason seems to be the high genetic costs cuckoldry brings the male victim. The average woman isn't as threatened as the average man by the purely sexual infidelity of a mate, apparently because it doesn't so immediately threaten her genes.

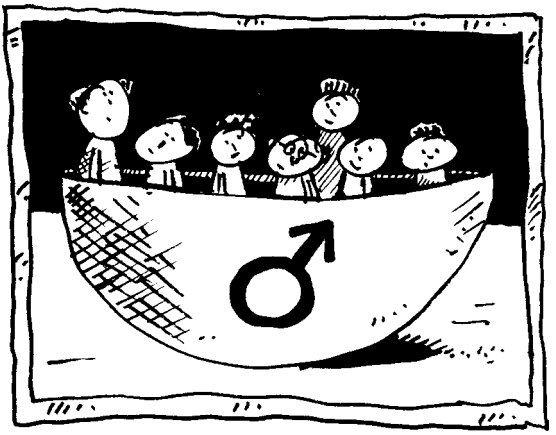
Even the radical feminists' famously expansive definitions of rape have some Darwinian merit. One of MacKinnon's more moderate utterances on the subject is this: 'Politically, I call it rape whenever a woman has sex and feels violated.'

Psychologically, too, you might call it that. When a woman has sex under a man's pretences of enduring affection (Darwinian translation: pretences of commitment to ensuing offspring) and then he never calls again, the evolutionary source of her anguish is the same as for the anguish following rape. She has had sex with a man she (unconsciously) deemed unworthy of her eggs, even though in this case the deeming was done after the fact, once evidence of his unworthiness surfaced.

Again, though, if you really want to claim such a broad realm of moral protection for women, you have to admit they're different from men and in some ways uniquely vulnerable. Men, after all, virtually never feel 'violated' by sex with a woman. A man may feel crushed if a woman he loves leaves him, but it is an odd man indeed who regrets the sex.

Dworkin has distinguished between rape and seduction by noting, 'In seduction, the rapist bothers to buy a bottle of wine.' Another feminist has opined that rape is 'on a continuum' with normal male sexual behaviour. Some Darwinians would agree. They'd say rape is something men do when other forms of manipulation fail. It may be natural when men with a manifest inability to legitimately obtain a mate resort to sex with aggression. Hence the profile of the typical rapist: he is lacking the material and personal resources to attract women.

Dworkin has written, 'A man wants what a woman has – sex. He can steal it (rape), persuade her to give it away (seduction), rent it (prostitution), lease it over the long term (marriage in the United States) or own it outright (marriage in most societies).' However depressing, this would strike some Darwinians as a fair thumbnail sketch of the



situation. This doesn't mean men think of their pursuits this way (in general the radical feminists attribute too much conscious calculation to men). But it is a fairly apt functional analysis of the emotions men feel – from lust to love to the selective evaporation of affection upon conquest.

Plainly, the resonance between radical feminism and Darwinism isn't just that the former's implicit depiction of female vulnerabilities is explicit in the latter. Darwinism also depicts men as something like the animals that MacKinnon and Dworkin say they are. Human males are by nature oppressive, possessive, flesh-obsessed pigs. They're not beyond cultural improvement, thanks to the fact that love, compassion, guilt, remorse and the conscience are evolved parts of the mind, just like lust and jealous rage. Still, MacKinnon and Dworkin are probably right to suggest that the current cultural climate does a lacklustre job of improving them.

Though Darwinism can empower the radical feminists' world view, they don't want its power to run quite so deep. Dworkin, for example, denounces female supremacists – some of the difference feminists – as being biological determinists. MacKinnon, hit by less radical feminists with the entirely apt label victim feminist, tries to fob it off on the difference feminists.

This aversion to biological determinism (a misnomer) is one thing all major brands of feminism have in common. Even the difference feminists don't want to talk about deep differences. Tannen, in her bestseller *You just don't understand* and her recent *Talking from 9 to 5*, says men are on average more concerned than women with status and hierarchy. This undeniable fact begs to be placed on its proper Darwinian foundation. During evolution, high male status seems to have expanded sexual access to females. This Darwinian perk has been documented in hunter-gatherer societies, the closest living model of the social context of human evolution. Given this distinctively male link between social achievement and genetic proliferation, it is plausible that millions of years of evolution would endow males with a distinctive thirst for power.

> 'Men often draw a morally coloured distinction among their romantic prospects, viewing some kinds of women as full-fledged human beings and others as something more like pieces of meat. One of the features that can put a woman in the latter camp is a reputation for extreme promiscuity'

Yet Tannen couches her explanation for this thirst in cultural terms. The tendency of boys to 'jockey for centre stage, challenge those who get it and deflect challenges' is 'learned' by boys and not girls because boys' groups 'tend to be more obviously hierarchical'. Well, lots of learning goes on, and every child has a range of flexibility whose bounds still aren't precisely known. Culture matters. But does that explain why the boys' groups are always more hierarchical in the first place? Tannen's overriding emphasis on culture would make more sense if she could point to a single one of the 1,200 societies on the anthropological record and show women, on average, pursuing social status and political power as fiercely and opportunistically as the average man. She can't.

Her evasion of Darwinism fails to keep her safe from the wrath of even the mild mannered equity feminists. Katha Pollitt says Tannen

and Gilligan 'massage their findings to fit their theories', and that their prominence just proves that social science is 'one part science and nine parts social. They say what people want to hear: women really are different, just the ways we always thought.' Maybe so. But did you ever wonder why it is that we've always thought that?

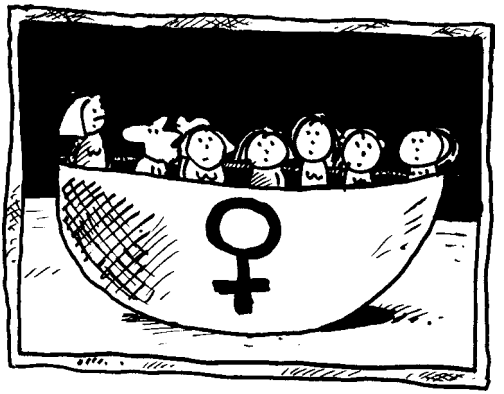
It's logical that liberal feminists would fear the idea of innate sex differences in ambition. For it imperils two liberal feminist legal principles. One is sex discrimination – in particular, the claim that a gross underrepresentation of women in high-paying jobs is by itself evidence of discrimination. This logic assumes not just that men and women are equally qualified, but that they pursue a given job or promotion with equal intensity. If men are on average more ambitious than women, this assumption falters.

'Men seeking to stress their victim status can also lay claim to being objectified, much as women are. Men could just as easily complain about being viewed as walking wallets'

The second legal doctrine imperiled by evolutionary psychology is affirmative action for women. It is sometimes justified on similar grounds – that, in the absence of discrimination, men and women would be equally represented at the higher levels of corporate and government life. But if men on average work harder at self-advancement, this rationale won't work.

As Ridley notes in *The red queen*, there are other possible rationales for affirmative action. Our emerging knowledge of male–female differences might lead us to favour quotas for women on grounds that they are less inclined than men to sacrifice the organisation's welfare to personal advancement. In other words, if a meritocracy is a place where people are promoted according to their actual value to the employer, then affirmative action may be needed to make the workplace a meritocracy.

Evolutionary psychology suggests that if affirmative action for women is to rest on coherent logic, the subject of sex differences will



have to come into play. Once again, if women want broad protection, they can most cogently seek it as women, not as persons.

The deepest source of the feminist aversion to Darwinism is larger and vaguer than specific policy issues. Evolutionary psychology seems to paint a generally grim view of the 'natural' order. Some of the ugliest things about the world, the very things that stirred modern feminist indignation to begin with, have biological roots. These include the male patriarchy the radicals see everywhere they look, as well as men's attempts to control the sexuality of women. Even the classically reviled male hypocrisy over promiscuity appears to be a legacy of natural selection. Men not only are naturally inclined to cheat on their mates. They are also inclined to abhor, and thus fiercely condemn, the philandering of a mate. Women share both of these inclinations, but they aren't as strong as the male versions. Indeed, a woman may actually reinforce this double standard when she finds herself able to forgive a husband's sexual infidelity in order to head off what for her female ancestors was a much bigger threat – a mate's desertion, his withdrawal of resources.

None of this is great news for feminism or humankind. But it isn't quite as bad as it seems. By clarifying what 'natural' does and doesn't mean, we can isolate the parts of evolutionary psychology that should most worry feminists.

To infer that what's natural is morally good is an elementary logical error, famously labelled the naturalistic fallacy by ethicist G E Moore.

Indeed, Darwinism not only doesn't tell us that the double standard is morally right, it tells us that any intuitive sense men have of its rightness is untrustworthy. Our moral institutions are a voice not from God but from our genes, echoes of our amoral creator, natural selection. What's natural may or may not be good, but it's certainly not good by virtue of the fact that it's natural.

Another thing natural doesn't mean is unchangeable. There are cultures in which the 'natural' male impulse to control female sexuality is expressed as ritual genital mutilation. But there are also cultures, like ours, in which men don't do such things. And there is no reason to think we've reached the biological limit of male malleability. Evolutionary psychologists aren't genetic determinists, and they aren't biological determinists except in a sense so broad as to encompass both genes and culture.

So much for the good news. The bad news is the average beer-drinking, two-timing, wife-beating lout isn't going to change his moral views after being handed a copy of G E Moore's *Principia ethica*. He is more likely to conveniently see modern Darwinism as a divine embrace of his loutishness. Also people aren't malleable enough to make communism a productive economic system, and they aren't malleable enough to create a society of perfect behavioural symmetry between men and women. Some changes simply can't be made and others will come only at some cost.

Here is where the word 'natural' assumes a second import that is not so easily dismissed as the first, and that feminists may find uncomfortable. Here we can expect men to turn the tables and use evolutionary psychology to talk about their vulnerabilities, to make their appeals for special treatment on grounds of peculiar biological predicament. Thus, for example, a man could argue for the double standard by saying his own philandering is hard to control and he is more vulnerable than his wife to the pain of a mate's sexual infidelity.

Obviously, this is a self-serving argument. And it can be combated in two ways – by pointing to the social costs of male infidelity (which are extremely high in the current social environment) and by noting that 'hard to control' doesn't mean 'impossible to control'. Still, this

argument, though combatable, isn't laughable in the way the naturalistic fallacy is. It uses our understanding of 'natural' impulses not to justify them as being right, strictly speaking, but to excuse them by stressing the psychic costs of defying them. Feminists are right to dread some of the rhetorical resistance Darwinism will abet.

Men seeking to stress their victim status can also lay claim to being objectified, much as women are. Feminists complain about women's beauty and youth counting for so much in the eyes of men. But men could just as easily complain about being viewed as walking wallets – about the fact that women place so much value on the social status and/or wealth of a mate. One reason you don't hear more about this male grievance is that low-status men have trouble getting their grievances heard. They aren't a very prominent group.

Darwinism's proper place in moral discourse is not to aid simplistic assertions about some natural order that is supposedly good or inevitable, but to inform arguments about the social costs and benefits of alternative norms in light of human nature, with heightened awareness of which groups the costs and benefits fall on. The issue of what is natural will enter the debate, but by itself should confer no justification for anything.

'Darwinism is certainly spinnable. Like all theories of human behaviour, evolutionary psychology merely limits the range of realistic moral and political discourse'

In retrospect, much of the recent history of feminism might have been predicted with the help of evolutionary psychology. To begin with, the prime mover of modern feminism, the discontent of the 1950s suburban housewife, was entirely natural. To see this, you need only look at a hunter-gatherer society, which, being a rough approximation of the social context of human evolution, is a guide to the patterns of behaviour 'natural' to us before the influence of modern technological society. In hunter-gatherer societies, women have a career: gathering.

But women in such societies are also mothers, the primary caregivers. And reconciling their home and work lives is surprisingly practical. When they go out to gather food, child care is barely an issue. Their children go with them or stay with relatives. And when mothers, back from work, do care for children, the context is social, even communal. Women weren't designed to be suburban housewives.

The generic suburban habitat of the 1950s was more 'natural', more congenial, for men. Like many hunter-gatherer fathers, vintage suburban husbands spent a little time with children and a lot of time out bonding with males, in work or play. Thus the grievance that drove 1950s housewives toward feminism was solidly grounded: suburbia let men behave naturally while forcing mothers into artificial isolation – removed from their kin, often lacking close friends and devoid of purpose beyond child-rearing.

If this inequity is clear from a Darwinian vantage point, so is the reason that redressing it has been hard. It is no surprise that many working mothers feel not just harried by their dual identity but guilty about it – about spending forty hours a week away from a one or two year old child while they are in the hands of someone who is neither kin nor close friend. That's not to say women can't adjust to this predicament. But anecdotal evidence suggests they don't easily do so, and that some working mothers today aren't dramatically happier than the lonely suburban mothers of the 1950s.

This is one of the most pressing issues now facing women. Various partial solutions are possible, such as job-sharing and workplace child care. But if these are to be pursued vigorously as feminist issues, it would help to acknowledge they are fundamentally the concerns of women. That although men can certainly play a large role in child-rearing, it's much easier for the average man than for the average woman to be away from young offspring.

Many feminists will admit no such thing. The reason women have always been primary carers, Pollitt writes, has nothing in particular to do with their psychology: 'Historically, women have taken care of children because high fertility and lack of other options left most of them no choice.' Which is why any evolutionary psychologist finds it hard to

believe that natural selection wouldn't have moulded the female mind to this task. Protecting the vessel that carries the genes into the next generation is, after all, pretty vital.

Some consider the liberal equity feminists the most sober of the major schools of feminism, and Pollitt in particular has become known as the voice of calm reason. Yet she and the other mainstream liberals may have the most warped vision in all of feminism. Quite unlike the difference feminists, and more than the radical feminists, they are committed to ignoring basic features of reality. Imagine a social observer as acute as Pollitt not sensing how deeply maternal women are compared with men. That must take a lot of perceptual restraint.

When Pollitt, under the pressure of overwhelming evidence, does concede some distinctive female feature, she seems disappointed, no matter how ostensibly laudable it is, and hastens to predict its demise. Thus she grants that 'social scientists who look for it can find traces of empathy, caring and so on in some women who have risen in the world of work and power.' But that's just because 'we are in a transition period' and working women haven't yet learned the ropes. Thus, it seems, we can look forward to a day when working women will have been stripped of the last trace of empathy and caring, when they will be just like men.

'Radical feminists such as MacKinnon and Dworkin have been criticised for saying genuinely nutty things – such as the theatrical suggestion that all heterosexual sex is rape. If their more measured positions can be justified at all, they are best justified in Darwinian terms'

The *reductio ad absurdum* of Pollitt's attitude has been performed by the feminist novelist Katherine Dunn. When she isn't celebrating the several women who have taken up boxing, Dunn spends her time trying to dispel some of the fuss about wife-beating by citing a study that showed that women strike their husbands about as often as men strike their wives. But getting hit is not the essence of being an abused spouse. Chronic intimidation is. How many husbands live in fear of assault by their wives? That major liberal magazines are publishing articles whose predictable effect is to downplay the plight of battered wives is a sure sign that equity feminism's denial of harsh Darwinian truths is reaching pathological extremes.

To be sure, neither the difference feminists nor the radical feminists come close to getting the whole picture. The difference feminists often stress ways women are good while the radical feminists always stress ways men are bad. Both tend to ignore female badness and male goodness. Also, of course, both schools deny any important role for biology. Still, at least the larger project of the radical feminists, and especially of the difference feminists, is quietly eroding that denial. That these feminists are emphatically not Darwinians makes their database even more valuable as objective corroboration.

With both Marxism and feminism, the struggle against the forces of oppression is worthy and, up to a point, practical. But in both cases, the struggle is best conducted with thorough comprehension of those forces and of their bases in human nature. If feminists – of all stripes – want to know their enemy, it is now available for inspection.

This article is adapted from a piece which originally appeared in *The new republic.*

Is there an evolutionist in the house?

Randy Nesse and George Williams†*

An anthropologist working with a recently contacted group of hunter-gatherers has the king and queen of these people as her house guests in London. They ask for an introduction to local culture, so she takes them to a tennis match at Wimbledon. They watch a game without comment and then ask her to explain it. She had been expecting that and therefore took detailed notes throughout the game. So she explains, in their language, every detail of the now completed game: the initial positioning of the players and the first serve, with a precisely Newtonian account of the manipulation and swinging of the racquet, the impact of the ball on taut strings, the aerodynamics of the ball's trajectory, its impact with the ground and subsequent trajectory, and so on. She even expounds on the physics and chemistry of the nerve and muscle machinery of the players and their trajectories across the court. Our guess is that the royal couple might have meant something rather different by their request and would not be satisfied with the anthropologist's detailed account. They would be satisfied only in the unlikely event of their having the strictly mechanistic mindset preached by the medical science educational establishment. They would then rigidly reject any suggestion that either player was trying to accomplish anything. It would be

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improper and mystical to suggest that one player might attempt to hit the ball into a part of the court that would be difficult for the other player to reach.

'Adaptations that lead to genetic survival in a population are likely to operate effectively only in historically normal conditions. For our species, this means the Stone Age'

This tennis match parable has close medical parallels. Doctors routinely witness contests, for instance, between plants that make toxins and people who eat them, or patients and tumours, and perhaps family members with partly divergent interests, such as mother and foetus.[1] The contest they most frequently observe is between patient and pathogen. Their formal training urges them to interpret all events and processes in rigidly mechanistic terms: energetics of lymphocyte and pathogen movement, molecular fits between antigen and antibody or hormones and receptor sites, and so on.

'Would it not be better for the vagina to open on the abdomen above the pubic synthesis rather than below it? There is no functional reason for the vagina to go through the pelvis, merely an historical one'

But is this what they really do? Of course not. We were discussing only their formal indoctrination. In real life, a physician's thinking and conversations with colleagues and patients include ideas about their patients' defending themselves with antibodies and other mechanisms, the pathogen's ways of evading such defences and of proliferating as fast as it can, and a wealth of other ideas appropriate to describing a contest. This departure from mechanistic thinking and the informal use of the biological concept of adaptation is surely justified, and fortunate for patients. Unfortunately, the medical profession is much less disciplined in its use of the adaptation concept than it is in using the

physics and chemistry that underlie the mechanistic approach. Physicians and medical researchers mainly rely on an untrained and intuitive grasp of adaptation. This is deplorable because misuse of the concept of adaptation can lead to medical mistakes and progress in evolutionary biology in the last few decades already provides a ready corrective.

For example, a prevalent view among those untutored in evolutionary biology is that natural selection leads to the evolution of conditions that are 'good' in various senses. It is assumed to favour health and happiness and long-term benefits to the population and its species. That which is normal must be good or it would not have evolved and become normal. In fact, none of these ideas is valid. Natural selection can be relied on to do only one thing for each individual. That is, secure the proliferation, within its population, of the genes that directed that individual's development. Common results of this process are pain, pathology, unhappiness and even the extinction of the population in which the process operates.

The misunderstanding stems from the pernicious concept of normalcy. For example, healthy human blood normally contains available iron of at least a generally accepted minimum. If the concentration is lower, it is judged to be abnormal and therefore wrong. However, as the American researcher Eugene Weinberg[2] has shown, a low iron level, though abnormal, can be an important defence against infectious bacteria which thrive on iron. A medication that raises the iron reading may make it normal, but also maladaptive for the patient. Augmented iron could provide a bonanza for the bacteria. An important defence against infection is mistaken for a defect, and adaptation mistakenly identified with normalcy.

It must also be borne in mind that the adaptations that lead to genetic survival in a population are likely to operate effectively only in historically normal conditions. For our species, this means the Stone Age. Undoubtedly the human gene pool has changed a bit since agriculture was adopted by some populations a few thousand years ago. Medically, the most important genetic changes may have decreased our vulnerability to diseases such as influenza, which can spread effectively only in dense populations. The fact remains that a few thousand years is trivial

in the evolution of a species with a turnover of generations in the order of three decades. We are, in the words of Boyd Eaton and collaborators, 'Stone Agers in the fast lane'.[3] Almost all contemporary human populations, be they pampered suburbanites, modern slum dwellers or third world peasants, live under environmental conditions strikingly different from those to which they were adapted by natural selection. For today's medical profession, an informed perspective on human life under normal – that is, Stone Age – conditions is essential to an appreciation of the many illnesses (infectious, nutritional, psychiatric and so on) that arise from an imbalance between our adaptations and lifestyles.

Even in the Stone Age, evolved adaptations in the form of optimal compromises no doubt caused many medical stresses. A woman's pelvic structure is a compromise between obstetrical and locomotor demands. So Stone Age babies were sometimes harmed by having to squeeze through a ring of bone narrower than would be ideal for a quick and harmless delivery. A gene that protects thirty-two per cent of a population from malaria may impose sickle-cell anaemia on four per cent. It is important for physicians and medical researchers to realise that evolved adaptations not only provide benefits. They also impose costs which need to be understood and perhaps even treated.

It is also important to realise that natural selection can optimise only quantitative parameters, not basic designs. A baby's passage through that pelvic ring is a good example. The diameter of the ring may indeed be an optimal compromise, but would it not be better for the vagina to open on the abdomen above the pubic synthesis rather than below it? It would indeed, because there would then be no conflict between obstetrical and locomotor requirements. A Caesarean delivery is a traumatic surgical correction of a design flaw in the human body, a correction sometimes worth the trauma.

There is no functional reason for the vagina to go through the pelvis, merely an historical one. Early in vertebrate evolution, several systems – digestive, excretory and reproductive – exited posterior to the bony supports of the pelvic fins. Later evolution of bony connections between pelvic and vertebral structures encircled the tubing leading to these exits and the bony circle persists in all modern

descendants. It is this historical legacy that dictates the basic geometry of childbirth. Other examples exist in plenty. An early use of the forward end of the digestive system for respiratory purposes means that, as modern descendants of lungfish, we are capable of choking to death on food. Similarly, an early borrowing of a reproductive duct for excretory usage means today's men can have urinary dysfunction from a part of the reproductive system increasing its size. Someone assaulted from behind might have escaped if equipped with an eye on the back of the head, in addition to the two pointing forward. Why are we restricted to two eyes? There's no functional reason. Unlike spiders or scallops, mammals have always had to make do with two eyes.

'Micropathogens, with many generation turnovers per day, can evolve in medically important ways well within a human lifetime. Human populations are hopelessly handicapped in any arms race with bacteria and viruses'

All these considerations make use of the idea that evolution, operating for enormous durations in the past, has produced the medically significant phenomena we confront today. Unfortunately, our micropathogens, with many generation turnovers per day, can evolve in medically important ways well within a human lifetime. Human populations are hopelessly handicapped in any arms race with bacteria and viruses. Not altogether surprisingly, the most widely appreciated applicability of evolutionary ideas to medicine is the rapid evolution of resistance to drugs by pathogens. A related, but less widely appreciated phenomenon is the rapid evolution of virulence. A parasite's current virulence reflects a compromise between the immediate reproductive advantage of a rapid exploitation of the host and the longer-term advantage of having the host continue to live for a time. So changes in the pathogen's ecology may cause it to evolve a higher or lower level of virulence. A valuable rule of thumb is that any change that increases a pathogen's ability to spread to new hosts will decrease the importance of host longevity and lead to higher virulence. An increase in the rate of change of sex partners, for example, might increase the virulence of a venereal disease. It is possible that HIV is not a new pathogen so much as an old one with greatly augmented virulence as a result of disrupted family life in tropical Africa in recent decades.[4]

Physicians and medical researchers can benefit from evolutionary insights only if they properly understand them. The obvious source for such understanding is their medical and pre-medical training. This means medical schools should teach evolution, and human evolution in particular, and list relevant courses in admission requirements. Medical students should learn the power and limitations of natural selection and be aware of the chain of historical contingencies that led to human nature as we now have it. For every disease discussed in class,

Infectious disease: who does what?

What hosts and pathogens can do	Examples	Beneficiary
Hygienic measures taken by host	Killing mosquitoes, avoiding sick neighbours, avoiding excrement	Host
Host defences	Fever, withholding iron, sneezing, vomiting, immune response	Host
Repair of damage by host	Regeneration of tissues	Host
Compensation for damage by host	Chewing on other side to avoid pain	Host
Incidental damage to host tissues by pathogen	Tooth decay, harm to liver in hepatitis	Neither
Incidental impairment of host by pathogen	Ineffective chewing, decreased detoxification	Neither
Evasion of host defences by pathogen	Molecular mimicry, change in antigens	Pathogen
Attack on host defences by pathogen	Destruction of white blood cells	Pathogen
Uptake and use of host nutrients by pathogen	Growth and proliferation of trypanosomes, a genus of protozoan parasite	Pathogen
Dispersal of pathogen	Mosquito transferring blood parasite to new host	Pathogen
Manipulation of host by pathogen	Exaggerated sneezing or diarrhoea, behavioural changes	Pathogen

the question 'why are we vulnerable to this problem?' should be raised, and interpretations of symptoms, analogous to those suggested in the table below, should be routinely proposed. This would not only result in better preparation for the next generation of medical practitioners and researchers, but would raise student interest and give the medical curriculum an intellectual coherence now sadly lacking.

Nesse and Williams elaborate on these topics and other applications of evolutionary ideas to medicine in their recent book, *Evolution and healing: the new science of Darwinian medicine* (Phoenix, London).

Notes

1. Haig D, Genetic conflicts in human pregnancy in *Quarterly review of biology* 1993; vol 68, pp 495–532.
2. Weinberg E, Iron withholding: a defence against infection and neoplasia in *Physiological Reviews* 1984; vol 64, pp 65–102.
3. Eaton B, et al, Stone Agers in the fast lane in *American journal of medicine* 1988; vol 84, pp 739–49.
4. Edwald PW, *Evolution of infectious disease*, Oxford University Press, New York 1994; ch 8.

Reading minds

Simon Baron-Cohen

How the study of autism can reveal evolved mechanisms in the mind.

Human beings pass effortlessly through the social world – empathising, loving, joking, arguing, cheating – taking their ability to do so for granted. These social capacities are crucial to our success in life. But what do we know about humans' capacity to understand what is going on in other peoples minds? For a Darwinian, a structure in the mind is likely to have a function which has been adaptive at some point. In this article, I show how recent work on the psychology of autism gives us insights into the evolution of such mental mechanisms.

A world of one

Autism starts early in childhood, affects mental development and is diagnosed on the basis of what is sometimes called the 'triad' of symptoms: abnormal social development, abnormal development of communication and impoverished development of imagination.[1] The last

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of these, limited imagination, also often goes hand in hand with extreme repetitive behaviour, or what Leo Kanner (the discoverer of autism) called 'an insistence on sameness'.[2] Such children not only fail to connect socially with others – hence the name autism, from the Greek word for self – but also find change in their environment very upsetting and seek to maintain a strict order in their lives, immersing themselves in material such as lists of objects, timetables or calendars, or performing rituals and routines.

In some respects, the parents of these children suffer more, for while their child may simply act as if they are oblivious of others, its parents work tirelessly to socialise it, seeking recognition that personal relationships mean something and that the child values the relationship with their parent in particular. Unlike the normal child, who wears their heart on their sleeve, revealing in a thousand ways to their parent that their relationship matters, the autistic child may act as if they are indifferent to people.

Parents of such children know they matter more than strangers, in that children with autism do form 'attachments' to familiar adults. But the normal exchange in the relationship just isn't there. These children will approach the parent when they need something but will otherwise appear self-sufficient in their activities involving the non-human world. Whereas the normal child takes pleasure in an exchange of smiles, of humour, a shared game or activity, or a conversation, the child with autism shows no interest in such social chit-chat.

Different rates of interest

We know from studies of normal development that during the pre-school years, children show specific social behaviours. They smile in response to eye contact at two months old and stay close to their parents at months nine to twelve. Reports of children with autism also suggest such behaviours may be present, though the accounts are usually retrospective. So it is unlikely that an absence of the social smile in infancy or of attachment at a year old, can be involved in the cause of autism.

Behaviour of normal children absent in autistic children

Age	Behaviour
2 months	○ smiles in response to eye contact
9–12 months	○ stays close to their parents
14 months	○ actively monitors where someone else is looking
	○ points at different objects in the environment
	○ brings objects to parent or carer
	○ monitors senses of seriousness/playfulness
	○ engages in pretend play

'By the tender age of fourteen months, children recognise there are two realities: the physical world and the world as someone might be construing it. In short, they have begun to mindread'

The normal child, however, does much more than this. At fourteen months old, he or she actively monitors where someone else is looking by turning to look in the same direction. This is called joint attention.[3] Normal children also turn to look at what someone else is pointing at, this time refocusing their attention on what the other person finds interesting. And at fourteen months, they point at different objects in the environment and check whether their parent or carer has turned to look too, they monitor whether another person is being serious or playful, threatening or affectionately teasing, and they engage in pretend play with others. Finally, at this age the normal child brings things over to their parent or carer, simply to show them. All these behaviours serve to bring the child and adult into a shared focus in space – 'a meeting of minds'[4] – but these kinds of behaviour are largely missing in children with autism.

Pointing and pretending

Here we see a catalogue of things that the normal child is doing at fourteen months which the child with autism is failing to do by

eighteen months – or indeed, for many years to come. What all these behaviours have in common is that they are about taking account of what is going on in another person's mind, and what their intentions are. It is as if, by the tender age of fourteen months, children recognise there are two realities: the physical world and the world as someone might be construing it. In short, the normal child has begun to mindread, while the child with autism is mindblind.[5]

Mindreading and mindblindness beyond infancy

If the normal child can be considered a mindreader, while the child with autism suffers in some respect from degrees of mindblindness, then we should expect to see this difference expressed in other areas of behaviour at later ages. This is exactly what we do find. By thirty months, the normal child is talking. Early speech is full of reference to the physical world (cups, cars, shoes, animals) as well as to the social world (mummy, daddy, eye movements, actions), but it is also full of words that refer to what is in people's minds (thoughts, desires, pretence, goals). Many studies of early normal speech have documented this remarkable precocity in young children's acquisition of 'mental state terms'.[6] By three years old, normal children say things like, 'Mummy thinks I'm sleeping, but I'm just pretending!' Children with autism, when they do start to speak, and many are delayed in this, seem to talk about just one level of existence: the physical. They use few, if any, words that refer to the contents of people's minds.[7] By four years old, normal children are even more sophisticated. They not only monitor what another person might think, but attempt to mislead people by planting false beliefs into their minds. They begin to deceive. This might be playful, as in hide-and-seek, or opportunistic. While we might frown on the morality of such behaviour, it is further evidence of the very human ability to mindread. Again, children with autism, by this age, have real difficulties in understanding deception, and rarely, if ever, lie themselves.[8]

Autism's Window on the mind

In observing such abilities and disabilities, we see the outline of a natural structure or mechanism in the mind – a mechanism for

mindreading, brought in to sharp relief by its absence (in degrees) in children with autism. We know now that autism is a genetic condition,[9] so mindreading might be genetically coded. We know that normal infants are not explicitly taught to mindread, but just do it. Currently, new neuroimaging techniques are being used to hunt down where in the brain this mechanism is located (probably in the prefrontal cortex), but the clear evidence of its origin and development in the normal infant and pre-schooler, and its impairment in infants and pre-school children with autism, shows it must be there.

> 'In some respects, the parents of autistic children suffer more, for while their child may simply act as if they are oblivious of others, its parents work tirelessly to socialise it'

It is not hard to imagine an evolutionary explanation for mindreading. Just try to imagine how much social life one would be capable of without such an ability. Our social lives would either be highly constrained, displaying rigid patterns like ants or bees, or they would be limited to physical interactions, like many species of monkey or ape. Important social interactions such as teaching, persuading, empathising, communicating flexibly and deceiving, would be impossible, since all these require the consideration of another person's mind. In the context of human survival, if you want a picture of how well one might cope without an ability to mindread when all around you there are people who can, you need look no further than the child with autism. They can survive physically, but are largely socially cut off.

The agility of maladapted mind games

Great caution must be exercised in thinking about psychiatric conditions within an evolutionary framework, since it is imperative that this approach is clearly distinguished from the morally offensive pseudo-evolutionary ideas that were taken up by the nazis. But with this important caveat in mind, there may be many ways in which the evolutionary

framework can provide a valuable lens through which to understand psychiatric conditions. One other is the group of anxiety disorders such as phobias and obsessive-compulsive disorder. It is not hard to imagine that the normal fear reaction evolved because it increased our chances of survival. It is only a short step from this to consider how the neural mechanisms controlling 'normal' fear can sometimes malfunction to produce 'abnormal' fear. The challenge for research in psychiatry now is to identify which psychiatric conditions are illuminated by being viewed within the spotlight of evolutionary biology.

Notes

1. Wing L and Gould J. Severe impairments of social interaction and associated abnormalities in children: epidemiology and classification in the *Journal of autism and developmental disorders* 1979; vol 9, pp 11–29.
2. Kanner L, Autistic disturbance of affective contact in *Nervous child* 1943; vol 2, pp 217–50.
3. Bruner J, *Child's talk: learning to use language*, Oxford University Press, Oxford 1983.
4. Butterworth G, The ontogeny and phylogeny of joint visual attention in Whiten A (ed), *Natural theories of mind*, Oxford University Press, Oxford 1991.
5. Baron-Cohen S, *Mindblindness and the language of the eyes*, MIT Press, Cambridge, Massachusetts 1995.
6. Wellman H, *Children's theories of mind*, MIT Press, Cambridge, Massachusetts 1990.
7. Tager-Flusberg H, What language reveals about the understanding of minds in children with autism in Baron-Cohen S, Tager-Flusberg H and Cohen DJ (eds), *Understanding other minds: perspectives from autism*, Oxford University Press, Oxford 1993.
8. Sodian B and Frith U, Deception and sabotage in autistic, retarded, and normal children in *Journal of child psychology and psychiatry* 1992; vol 33, pp 591–606.
9. Folstein S and Rutter M, Infantile autism: a genetic study of 21 twin pairs in *Journal of child psychology and psychiatry* 1977; vol 18, pp 297–321.

   Folstein S and Rutter M, Autism: familial aggregation and genetic implications in *Journal of autism and developmental disorders* 1988; vol 18, pp 3–30.

Is honesty the best policy?

Robert H Frank

Darwinism does not have to mean there are only ruthless swines.

There is a roadhouse outside Ithaca, New York State, where my wife and I gather occasionally with several friends and our families for dinner on Friday evenings. Our children love going there because, after eating, they get to go into the bar with a pocketful of coins to play the pinball machines while their parents linger at the dinner table. One recent evening, my nine year old son, Chris, came back to the table to report that one of the machines had eaten several of his quarters.

'What did you do about it?' I asked him. 'I told the bartender and he gave me some extra quarters,' he responded. 'So what's the problem?' I asked, noticing that he still seemed troubled. 'I think the bartender gave me one more quarter than I lost,' he said. 'What do you think you ought to do?' I asked. 'Tell the bartender,' he replied resolutely.

As we left, Chris went up to the bartender and handed him a quarter, explaining what had happened. Several people sitting at the bar chuckled at this and one told Chris he was foolish to have given back the quarter. Is honesty the best policy? Although armchair and professional

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philosophers have debated this question for millennia, no clear consensus has yet emerged. The answer seems to depend, after all, on whose perspective we have in mind by the term 'best'. If we take the perspective of society as a whole, for example, most of us would say that honesty clearly is the best policy. (If forced to choose between living in a society in which everyone was honest, including you, or one in which noone was honest, would it really be so difficult a decision?)

Disagreement begins, however, once we take the perspective of the individual. Cynical comments like the one directed at my son reflect the view – by no means uncommon – that, although it would be nice if everyone were honest, we live in a competitive world and must seize our opportunities when they arise. Others counter that honesty pays dividends even at the individual level. Thus, they argue that there is always a chance dishonest persons will be caught and punished; and they add that, quite apart from the material pay-offs involved, the honest person typically enjoys greater peace of mind.

But the cynics' retort is adamant: there are plenty of occasions on which the chances of being caught and punished are negligible. For instance, the bartender would never have known if my son had kept the extra quarter, and, even if he had known, it would have been too costly for him to do anything about it. Moreover, peace of mind doesn't pay one's way in the world.

My claim in this essay is that the emerging science of evolutionary psychology contributes a fresh twist to this tired debate. Evolutionary psychologists begin with the proposition that the human central nervous system is best understood as the product of Darwinian natural selection. Thus, the details of our cognitive, appetitive and emotional repertoires are intelligible only when viewed as adaptations – features of the organism that enhance its ability to survive and leave offspring.

This perspective might appear to place evolutionary psychologists squarely on the side of the cynics in the honesty debate. But, although some evolutionary psychologists do take essentially this position, I will argue that Darwinian logic is more consistent with the opposite view – that honesty promotes not only the interests of the group, but those of the individual as well.

Why a superficial reading of Darwin backs deceit

The number of descendants that an organism leaves behind depends, in part, on its ability to acquire food and other resources necessary to sustain life. Any characteristic that enhances that ability tends to be favoured by natural selection. Some traits, such as intelligence or keen eyesight, are beneficial both to the individuals who have them and the larger populations in which they reside. Other traits, however, pose a conflict between the individual and the group.

Consider, for example, how the hackles on a dog's neck and back rise when it is about to fight a rival for the same mate. This mechanism serves the individual dog's purposes because, by making him appear to be larger, it increases the likelihood of his being able to intimidate his rival. (Evolution saw to it that dogs know better than to fight an opponent who is significantly larger.) From the perspective of dogs as a group, however, the hackle raising mechanism is largely wasteful, for when all dogs raise their hackles, their rank ordering by apparent size is the same as if none had done so. The bodily resources required to sustain the hackle raising mechanism could have been put to better uses – perhaps by supporting sharper vision or a keener sense of smell.

One of Darwin's central insights was that selection pressure is more intense at the individual than at the group level. Thus, even though dogs as a species would fare better if none had hackle raising mechanisms, any individual dog that lacked this mechanism would pay a prohibitive reproductive penalty. His ability to see or smell better is of little consequence, after all, if it comes at the expense of securing a mate.

Superficially, at least, the same Darwinian logic appears to work against the evolution of honesty. For the purposes of this discussion, suppose we define an honest person as someone who keeps a promise even though it would be advantageous for her to break it. Suppose further that there are many situations in which enforceable promises would be mutually advantageous to all parties involved. For the sake of concreteness, imagine a situation in which the owner of a thriving business wants to start up a branch of that business in a distant city. Her concern is that she will not be able to monitor the behaviour of the person she hires to manage the branch, and that they would be in a position to heavily embezzle from the business.

If the owner could find someone who could credibly promise to manage honestly, both owner and manager would benefit – the owner for obvious reasons and the manager because this would enable the owner to pay a premium salary. For example, suppose that if the owner hires someone who manages the new branch honestly, she can afford to pay a weekly salary of £1,000 – a premium of £500 over what the manager would have otherwise been able to earn – and still reap a weekly financial return of £1,000 for herself. But suppose also that a dishonest manager can draw £1,500, damaging the business and causing the owner a financial loss of £500 per week.

Under these assumptions, their combined benefits under honest management – £500 + £1,000 = £1,500 per week – are £1,000 higher than their combined benefits under dishonest management; although the dishonest manager's income is £1,000 more than if she had not been employed at all, the result is that the owner is now £500 worse off. Thus from a collective perspective, honesty is clearly the best policy. Now suppose that a seemingly attractive candidate 'promises' to manage the branch operation honestly. The difficulty is that, once this manager is hired, it will be in her financial interest to break her promise. The owner, however, will have no way of being sure that she did so, since poor financial returns could also have been the result of other factors. And hence the fundamental conflict between the interests of the owner and manager as individuals and their interests as a group.

If the owner thinks that people are fundamentally dishonest, she will predict that the manager will break her promise since both parties know that the owner has no way of enforcing it. And this implies that the owner's best option is not to open the branch in the first place. The result is that each party sustains a loss – an 'opportunity cost' in the economist's parlance: the unhired manager's foregone £500 salary premium, and the owner's foregone £1,000 return.

To see how Darwinian forces appear to work against the evolution of honesty in situations like these, imagine an environment in which pay-off structures like the one described above were common, and in which an initial population contained some individuals who were genetically predisposed to be honest and others predisposed to be dishonest. If the proportion of honest people were high enough to begin with, it would have paid owners to open the distant branches on the chance that the managers they hired would turn out to be honest. It is true, in this case, that an honest manager would have earned more than someone who was not hired for such a position at all. But the dishonest manager would, in turn, have received a still higher pay-off.

The implication is that dishonest individuals will leave more offspring than others, causing dishonesty to proliferate. In the end, honest persons would appear destined for extinction, even though a population consisting only of dishonest persons would do worse than one consisting only of honest persons.

A friendly amendment

As even cynics must concede, however, abundant evidence contradicts the claim that everyone is dishonest. In one experiment, for instance, wallets were dropped on street corners, and about half of them were returned in the mail to their ostensible owners with the cash intact.[1]

How might the impulses that drive such behaviour have survived the ruthless culling of natural selection? A simple change in the assumptions of our branch manager story suggests one possible answer. In that story, owners had no practical means to distinguish honest managers from dishonest ones. But suppose that honest individuals bore some identifying marker – say, a red birthmark in the shape of an 'H' on their

foreheads. Owners would then be able to hire honest managers and avoid dishonest ones. As a result, individuals with the honesty trait would receive higher pay-offs, causing honesty to proliferate. This time it is the dishonest individuals who appear destined for extinction.

The assumption of a red birthmark is fanciful, of course, but there do in fact appear to be statistically reliable signals that distinguish honest persons from dishonest ones. The key to understanding the logic of these signals is to recognize that honest behaviour is motivated not by rational calculation about advantage, but by emotion. Thus, the person who keeps a promise does so not because she calculates that she will be better off if she keeps it, but because she feels sympathy to the interests of the promisee, or because she would feel guilty if she broke her word.

As Darwin himself first pointed out in his 1872 book, *The expression of emotion in man and animals*,[2] such emotions have characteristic signatures that are visible to all. For example, when my son reported to me that the bartender had inadvertently given him an extra quarter, his concern was evident not just in the words he chose, but also in the expression upon his face: eyebrows elevated at the bridge of the nose and slanting downward toward the edge of the face, the furrows at the centre of the brow. This expression is produced by a complex combination of facial muscle contractions – principally, of the pyramidal muscles at the bridge of the nose and the corrugator muscles at the centre of the brow. This combination is extremely difficult to summon wilfully.[3] (If you are sceptical, sit before a mirror and try it!) Yet the expression appears spontaneously on the faces of subjects experiencing the

emotions of sadness, concern or perhaps even guilt. Subjects living in any culture on earth can reliably identify the emotions contained in this expression.

In addition to facial expressions, there are other statistically reliable cues to emotion. Thus, posture and other elements of body language, the pitch and timbre of the voice, the rate of respiration and even the cadence of speech are systematically linked to underlying emotional states.[4] Because these linkages are beyond conscious control in most people, it is difficult to conceal certain emotions. And it is equally difficult to feign the characteristic expressions of these emotions on occasions when they are not actually experienced. We are therefore able to employ such clues to form estimates of the emotional make-up of others, and judgements about their character.[5]

If we were able to make perfectly reliable character judgements, we could always avoid dishonest people in ventures that require trust. Such people would earn lower pay-offs than those who are honest and, according to Darwinian theory, would eventually be driven from the population. But evolution has been going on for billions of years. That so many dishonest people remain among us suggests that perfectly reliable character judgements are either impossible or at least costly.

Consider the implications of this last possibility – that if we incur the costs of scrutinizing potential trading partners, we can make accurate character judgements about them. Would it pay to incur these costs? That would depend on how likely it is that a randomly chosen trading partner is dishonest. If that likelihood is high, then it pays to be vigilant, just as it pays to install an expensive security system in a flat located in a high crime neighbourhood. But if the overwhelming majority of one's potential trading partners are honest then extreme vigilance will simply be wasteful.

These observations suggest a tendency for populations to gravitate toward a stable mix of honest and dishonest people. Because populations that consist almost exclusively of honest people would discourage vigilance in the choice of trading partners, opportunities would be ripe for dishonest people in those populations. This would mean the share of dishonest people would grow. Conversely, because populations with

only a small minority of honest people would strongly reward vigilance in the choice of trading partners, honest people would avoid interacting with dishonest people and the resulting higher pay-offs to honest people would cause their share of the population to grow. At some intermediate mix of the two types, these countervailing forces will be in balance and the composition of the population will therefore tend to stabilize.

The problem of mimicry

For honest individuals to be able to survive in competition with dishonest individuals there must be some means by which honest individuals can identify, and interact selectively with, one another. But if there is advantage in being honest and perceived as such, there is even greater advantage in appearing to be, but not actually being, honest. After all, a liar who appears trustworthy will have better opportunities than one who glances about furtively, sweats profusely, speaks in a quavering voice and has difficulty making eye contact. Indeed, he will have the same opportunities as a genuinely honest person, but will get a higher pay-off because he exploits them to the fullest.

The behavioural clues we employ to reach character judgements are obviously far from perfect. Even experienced professional polygraph experts cannot be sure when someone is lying. If the ability to mimic the signals of trustworthiness were perfect, the mechanism that sustains the evolution of honest individuals simply could not work. Fortunately for honest individuals, however, instances of perfect mimicry do not appear to exist in nature.

Consider the monarch butterfly, whose foul taste protects it from predators that have learned to associate the objectionable taste with the monarch's distinctive wing markings. The similar wing markings of the viceroy butterfly provides it with a measure of protection against the same predators, even though the viceroy has not incurred the cost of producing the bad taste.

The protective cover provided by the monarch depends on the continued presence of sufficiently many monarchs in the environment to keep predators on guard against the foul taste. But if the viceroy were able to mimic the monarch's wing markings perfectly and without cost, the protective power of these markings would soon decay – for the viceroy would then be just as likely as the monarch to escape predation, even though it hadn't expended the bodily resources to manufacture the foul taste. The viceroy's share of the population would grow because of this advantage, and predators would eventually lose their incentive to avoid the wing markings.

But this has not happened, leading us to conclude that perfect mimicry either has not had time to evolve or entails significant costs. The fact that the bearer of the genuine trait has the first move in this game will often prove a decisive advantage. Thus, the monarch's wing markings are themselves evolving, and it is more difficult to hit a moving target than a stationary one.

Similar logic applies to those who would mimic emotional traits. If the signals we use for detecting these traits had no value, we would have long since ceased to rely on them. The inevitable result is an uneasy balance between people who are really honest and others who merely pretend to be.

Living by honesty

One popular impression of Darwin's message is that only the ruthless and powerful can survive the relentless pressures of natural selection. Even many sophisticated Darwinians cling to the belief that honesty in one-shot encounters with strangers cannot survive these pressures. This view collapses, however, if people are able to make reasonably accurate character assessments.

In the end, the question of whether people have this ability is an empirical one. Elsewhere, together with my colleagues Tom Gilovich and Dennis Regan, I have shown that, even on the basis of brief encounters involving strangers, experimental subjects are adept at predicting who will cooperate and who will defect in prisoner's dilemma games[6] (these are games in which two people know that if one snitches on the other his sentence will be reduced, but if they both remain silent they will both be freed). Thus, in one version of our experiments, the base rate of defection was only twenty-six per cent, but the accuracy rate of predicted defections was more than fifty-six per cent. It seems reasonable to expect that predictions regarding others whom we know well would be even more accurate.

Suppose you lost a labelled envelope containing £1,000 in cash at a crowded concert. Can you think of someone you feel sure would return it to you if he or she found it? If so, then you accept the central premise of my friendly amendment to the traditional Darwinian account of honesty. As long as it is possible for honest individuals to identify at least some others who are also honest, and to interact selectively with them, such individuals can survive in competitive environments. If this does not quite imply that honesty is the best policy at the individual level, it does say that honesty is a policy that individuals can live with.

Notes

1. Hornstein H, *Cruelty and kindness*, Prentice Hall, Englewood Cliffs, New Jersey 1976.
2. Darwin C, *The expression of emotion in man and animals* Philosophical Library, New York 1995 (originally published in 1872).
3. Ekman P, *Telling lies*, WW Norton, New York 1985.
4. Ekman P, Friesen W and Scherer K, Body movements and voice pitch in deceptive interaction in *Semiotica* 1976; vol 16, pp 23–7.
5. Observable expressions of emotion are not the only reliable clues to character. For a discussion of the role of reputation and other factors, see chapter four of my *Passions within reason*.
6. Frank R, Gilovich T, and Regan D, The evolution of one-shot cooperation in *Ethology and sociobiology* July 1993; vol 14, pp 247–56.

The ancients of trade

Matt Ridley

In the second chapter of *The wealth of nations*, Adam Smith buried one of those intriguing little speculations for which he is famous. Trade, he suggested, is one of the features distinguishing the human being from other animals. All other animals are basically thrown on their own individual resources. Each one has to be a jack of all trades. Human beings, on the other hand, are specialists who divide labour among themselves. 'Each animal' wrote Smith, 'is still obliged to support and defend itself, separately and independently, and derives no sort of advantage from that variety of talents with which nature has distinguished its fellows. Among men, on the contrary, the most dissimilar geniuses are of use to one another; the different produces of their respective talents, by the general disposition to truck, barter and exchange, being brought, as it were, into a common stock, where every man may purchase whatever part of the produce of the other men's talents he has occasion for.'

Smith was wrong about animals, but only just. There are divisions of labour among animals, but they are nearly all in the inbred colonies of the highly social animals such as termites, ants, bees, naked mole rats, corals. But these colonies are not societies, they are families. Divisions of labour among unrelated individuals of the same species are extremely rare in the animal kingdom. I have found only two clear cases: burying

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Science writer and author of *The origins of virtue*.

'So desperate were the Yir Yoront to obtain steel axes that to get a single axe, a man might prostitute his wife to a total stranger'

beetles and huia birds (now extinct), which combined the separate skills of male and female into a team.[1] Among birds in the hornbill family, males wall their mates into the nest and feed them through a slit during incubation of the eggs – a temporary division of labour.

Moreover, trade consists of exchange between groups rather than individuals. For this, there is no animal parallel at all. Ant colonies do not trade with other ant colonies. There is little doubt that 'truck, barter and exchange' are critical to our ecological success as a species. They enable us to make society more than the sum of its parts. Without the division of labour, each of us would have to spend all day and every day seeking the bare essentials of food, clothing and shelter. Back to nature fans soon discover that self-suffiency is hard work.

I have argued elsewhere that these divisions of labour, far more pronounced in human beings than other animals, go deep into our evolutionary past as a species – the sexual division of labour between hunting husband and gathering wife, for example, is probably millions of years old. But how old is the habit of trade between groups? Most primates live in competitive, territorial troops that interact only in hostile ways. Our distant ancestors almost certainly shared this habit. But at some point, human groups became permeable. It became possible for cooperative trading relationships to emerge between groups – although inter-group hostility did not disappear. When did that first happen? Most economists assume it was fairly recent, arguing that trade followed on the heels of law, for it was not until statute law could protect merchants that they could safely venture abroad. This perspective sees trade as a medieval or classical invention rather than something that has been happening since prehistory.

Such an argument is easily dismissed. Not only did medieval merchants develop extensive and profitable trade patterns long before there was statute law to protect them, they actually invented their own

'There is little doubt that 'truck, barter and exchange' are critical to our ecological success as a species. They enable us to make society more than the sum of its parts'

law which was simply nationalised by late medieval monarchs. Bruce Benson argues that the 'lex mercatoria' was a system of customs enforced by simple procedures and sanctioned by ostracism among merchants long before there were any state laws governing trade.[2]

Besides, there is ample evidence from the ancient world that trade flourished long before there was anything recognisable as the rule of law. The Phoenicians built their whole civilisation on Mediterranean trade and the Old Testament is replete with examples of traders and traded goods. The archaeological record continues the hunt still farther back in time. Pierced shells used as ornaments were travelling four hundred miles inland from their origins on the coast at least 30,000 years ago to end up in the graves of their Cro-Magnon owners. It is most unlikely that they travelled on the necks of the ultimate wearer – much more likely that they passed from hand to hand along a chain of traders of different bands or tribes. Indeed, decorative goods could move quite large distances even 60,000 years ago, though we cannot be sure they were traded.

Additional evidence comes from the studies by modern anthropologists of stone-tooled peoples. To have survived into the nineteenth and twentieth century with stone-age technology has required a highly unusual degree of isolation, usually in the forests of New Guinea or the Amazon. For this reason, and because modern goods disrupt trade patterns before physical contact is even made with white men, anthropologists have tended to underestimate trade among hunter-gatherers.

Even the fierce people had truck with trade

None the less, it is clear that trade is universal. An illuminating example is the case of the Yanomamo, studied by Napoleon Chagnon in the Venezuelan rain forest. Chagnon concludes that the Yanomamo live in

a state of chronic warfare between villages. The key to success for a Yanomamo village is alliance with another village. A complex network of variously intimate *ententes* binds together different villages into competing alliances. The glue of such alliances is trade. Chagnon believes Yanomamo villages deliberately engineer a division of labour between them in order to provide an excuse for trade which then seals their political alliance. Each village has one or more special products that it provides for its allies. These include items such as dogs, hallucinogenic drugs (both cultivated and collected), arrow points and shafts, bows, cotton yarn, cotton and vine hammocks, baskets of several varieties, clay pots, and, in the case of contacted villages, steel tools, fishhooks, fishline and aluminium pots.[3] This is not because each village has better access to particular raw materials. Every village could in principle supply its own wants. But the people deliberately choose not to, because – though Chagnon thinks it is not necessarily a conscious motive – it helps stimulate trade and hence alliances. He gives the example of a village that relied on an allied village for its clay pots and whose people claimed they could not or had forgotten how to make them. However, when they fell out with their allies, they quickly remembered the skill of pot making for themselves. Yanomamo villages largely trade artefacts, not food. I suspect this is a universal feature of early trade – that it relied on a technological division of labour, not an ecological one. It is fairly self-evident that trade between bands was, and is, better suited to the exchange of manufactured goods than anything else. Within the group, individuals probably exchanged food and information more often but food is too perishable and information too local for inter-band trade.

'The Yanomamo live in a state of chronic warfare between villages. Some believe Yanomamo villages deliberately engineer a division of labour between them in order to provide an excuse for trade which then seals their political alliance'

More striking still is the case of the Yir Yoront aborigines who live at the mouth of the Coleman river on the York Peninsula in northern Australia. Until the late nineteenth century the Yir Yoront used polished stone axes to gather wood for camp fires, to build and mend their wet season huts and to dig for roots or cut trees for fruit and

fibre. Yet the nearest quarries from which suitable stone for making axes could be mined were four hundred miles inland to the south. Between the Yir Yoront and the quarries lay many other tribes. The stone axes reached them from the tribes that lived around the quarries because there was a long line of trading partners who passed them on in exchange for other goods going south through the same hands. Indeed, the Yir Yoront were not the end of the chain – their neighbours to the north relied on them to pass on the very same axes. Meanwhile, spears tipped with the barbs of sting-rays went the other way.

Although the trading was between different tribes, it was still mostly man to man, each individual having a preferred dealing partner in the neighbouring tribe, probably for reasons of trust. It worked not because of some overall plan by the Yir Yoront to produce sting-ray barbs and trade them for axes, but because of a simple question of price. A Yir Yoront could buy one stone axe head from his southern neighbour for a dozen barbed spears. He could sell an axe head to his northern neighbours for more than a dozen spears. He could therefore make a profit on the deal. So he tended to pass the axes north. As his spears worked their way south, their value rose relative to that of the stone axe heads. One hundred and fifty miles inland, one spear was worth one axe head. By the time it reached the quarry, it was probably (nobody recorded the truth) worth a dozen axe heads. Most of the people through whose hands the items passed manufactured neither axe heads nor spears. But it is not hard to see that they could make a handsome profit by keeping some axe heads and some spears simply by acting as middle men. They had discovered arbitrage, buying something where it is cheap and selling it where it is dear. By the end of the nineteenth century, apart from an occasional bloody skirmish with white settlers, the Yir Yoront were still largely untouched by the modern world. But already they had steel axes which had begun to work their way north from camps where they were distributed by missionaries. Steel axes were so superior to stone ones that they cost far more. Desperate to obtain them, the Yir Yoront were reduced to drastic measures in their attempt to raise sufficient funds. The tribal gatherings during the dry season when in the past men had obtained a year's

supply of stone axes from their partners now became rather less enjoyable. To get a single steel axe, a Yir Yoront man might prostitute his wife to a total stranger.[4]

The Yir Yoront had discovered David Ricardo's law of comparative advantage, which has been described by Paul Samuelson as the only proposition in the whole of the social sciences that is both true and non-trivial. It is a simple concept, though hard to put into words. It pays one tribe to import a product from another tribe even if the first is better at making the product, so long as the first tribe is even better at making some other product that the other tribe needs. Tribe A may be good at making axes and very good at making spears, while tribe B is bad at making both. It pays tribe A to make only spears and use some of them to buy axes from tribe B, rather than to make its own axes. Trade is just Adam Smith's division of labour writ large.

Trading theories of origins

But if the Australian aborigines, who are now reckoned to have reached Australia perhaps 60,000 years ago, had sophisticated patterns of trade, then how much farther back does trade go? I believe our ancestors were probably exchanging goods between bands hundreds of thousands of years ago. Perhaps even millions.

Supporting evidence for this assertion of the antiquity of trade comes, curiously, from psychology. The psychologist Leda Cosmides and the anthropologist John Tooby have drawn together an impressive body of experimental evidence which shows our brains are equipped with a special domain-specific organ for reasoning about the equity of social exchange. One of the surprises of recent evolutionary biology has been the discovery of how rare reciprocal exchange is. Apart from a few limited cases in vampire bats, apes, monkeys and dolphins, reciprocal exchange has been disappointingly hard to find in the animal kingdom. But it permeates all aspects of human society, so we would expect the human brain to have highly developed instincts tuned to reciprocity and exchange, just as it has highly developed instincts tuned to language capability. This is what Cosmides and Tooby claim to have found.

Yet you may search the anthropological literature in vain for an admission that trade is both ancient and common in pre-industrial people. Most anthropological discussions hunter-gatherer humankind, squatting on the savannah, entirely self-sufficient in all its needs. They

recognise, perhaps, a division of labour between husband and wife, perhaps even between good hunters and good honey-finders, but not between one band and another.

This is a very parochial perspective, rather like the absurd notion that some over-educated historian once tried to persuade me of, that love was unknown before the Middle Ages. I suspect that the savannah was home to many different kinds of bands of early human beings. Near the shores of the lake where Olduvai Gorge now stands there might have been fishermen, engaged in a lively trade swapping reed baskets for bone hooks from the big-game hunters further inland, who in turn traded hides for stone with the men who lived in the forests to the west, and so on, all across the continent.

Notes

1. Ridley M, *The origins of virtue*, Viking, London 1996.
2. Benson B, The spontaneous evolution of commercial law in *Southern economic journal* 1989; vol 55, pp 644–61.

   Benson B, *The enterprise of law*, Pacific Research Institute 1990.
3. Chagnon N, *Yanomamo, the fierce people* (third edition) Holt, Rinehart and Winston 1983.
4. Sharp L. Steel axes for stone-age Australians in *Human organisation* summer 1952; pp 17–22.

Game theory and evolution

Ken Binmore

Each person in a group is a player in a game if their welfare is influenced not only by their own decisions, but also those made by the other people in the group. Game theory is about choosing optimal strategies in such games. Its basic notion is the idea of a Nash equilibrium. John Nash, the Nobel laureate, had it that the players' choices of strategy are in equilibrium if no player can do better by altering their choice, given the choices of the others.

It was John Maynard Smith, in his celebrated *Evolution and the theory of games*, who first systematically explored the possibilities for adapting economists' ideas on game theory for biology. In Maynard Smith's hawk-dove game, animals of the same unisex species are randomly matched in pairs to compete for breeding resources. Each animal is genetically predisposed to be hawkish or dovelike. When a hawk meets a dove, the dove retreats and the resource goes entirely to the hawk. When two doves meet, they share the resource. When two hawks meet, they fight – with potentially highly damaging consequences for both animals. This situation can be modelled as a simple symmetric game with two strategies, hawk and dove, for each player. Since it is always best to choose the opposite strategy to your opponent in the game, no Nash equilibria exist in which both players make the same

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pure choice of strategy. As in the children's game of rock-scissors-paper, the only Nash equilibrium in which the players choose their strategy in the same way is when each over-rides pure strategies by using the payoffs of the game to calculate the probabilities surrounding the next move. These probabilities predict what fraction of an evolutionarily stable population will be hawks and what fraction will be doves.

Game theorists believe the simplest class of games that are adequate to study human societies are indefinitely repeated games – those in which a relatively static game is played over and over by the same players with a random stopping time. Technically, such games have an infinite number of strategies. Their importance lies in the fact that they allow I'll-scratch-your-back-if-you'll-scratch-mine principles to emerge as equilibrium behaviour. As Confucius argued, understanding how such reciprocal arrangements operate is perhaps the single most important factor in getting to grips with human sociality.

Most people know of the prisoners' dilemma. In this famous game, each player can either costlessly provide their opponent with a service that is worth £2 to the opponent, or else steal £1 from his opponent's pocket. By analogy with the dove-hawk game, let us call these strategies dove and hawk. Traditional morality says that each player should choose dove. But such behaviour is not evolutionarily stable. Instead, each player will choose hawk in equilibrium, because hawk is a best reply whatever the opponent may choose.

Much effort has been devoted to finding some way round this unpalatable piece of reasoning. It is argued that only stupid people would be caught in such an evolutionary trap. It is said, for example, that really clever people will recognise the validity of Kant's categorical imperative: act only on the maxim that you can at the same time will to become a universal law. When choosing hawk in the prisoners' dilemma, I cannot sensibly will that everybody should choose hawk in situations that are strategically equivalent. If everybody is to play what I play, I would prefer to play dove. But all such arguments are fallacious. If you are trying to maximise your pay-off in the prisoners' dilemma, then no amount of fancy reasoning can evade the simple fact

that hawk always does better than dove however you or your opponent may reason.

Just as Maynard Smith reinvented the familiar game of chicken with his story of hawks and doves, so the idea behind another folk theorem was rediscovered some twenty years later by the biologist Robert Trivers. This says that almost any outcome of the static game that gets repeated can be sustained as a Nash equilibrium provided the players never have reason to think any particular repetition is likely to be the last. He coined the expressive term reciprocal altruism for the mechanism that makes the theorem work. Axelrod's celebrated *Evolution of cooperation* provides the most familiar example. In the indefinitely repeated prisoners' dilemma it is a Nash equilibrium for both players to play tit-for-tat. This strategy tells the players to begin by play-ing dove, but then to reciprocate what ever the opponent did in the previous round. Both players then cooperate by playing dove at every repetition, because any deviation by one player will trigger a punishing response from the opponent that makes the deviation unprofitable.

The reason for emphasising the importance of the folk theorem for social science is that it shows any game of interest will have enormous numbers of Nash equilibria.

Nor will the evolutionary stability refinement of Maynard Smith assist in distinguishing among these, since this idea takes for granted that mutations appear one at a time, after which the system has a chance to go to equilibrium before the next mutation appears.

But in a social context, the current status quo will be bombarded with new strategies all the time as people invent new ideas or adapt old ones to new circumstances. In a social context, one therefore cannot evade what game theorists call the equilibrium selection problem. When a game has many equilibria, how do players go about deciding the equilibrium on which to coordinate?

Doubtless, there is a long road yet to be travelled before such pioneering work pays genuine empirical dividends. But it is enormously encouraging that game theorists have dropped their attempts to solve this equilibrium selection problem by the invention of more and

more elaborate definitions of what it means to be super-humanly rational. The study of stylised versions of the dynamic processes of interactive learning by which real people find their way to equilibria in the games they play in their daily lives is the welcome alternative.

A lingua franca of facial expressions

Paul Ekman

Think you've got a unique form of facial expression? Think again.

Are facial expressions of emotion the same for all people? When someone is afraid, or happy, will you see the same facial appearance no matter what the person's nationality, race or culture? Can we understand a foreigner's emotional expressions without first attending a facial language school which tutors us in what expressions mean in their culture?

'We often follow display rules in social life to manage and disguise our emotional expressions, and these vary with age, sex, social class and culture'

If facial expressions of emotion are universal, does that mean they are innately determined? Do we inherit the particular facial muscular movements for fear, anger, sadness and so forth? Is it our genes that determine which facial muscles contract when we feel one way or another? And, if facial expressions of emotion are universal and

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innately determined, are they the product of evolution? Are human facial expressions of emotion similar to those shown by other primates? Do the principles that explain why our lips turn down in sadness rather than up, also explain the facial muscular movements of the chimpanzee or the wolf?

Charles Darwin said the answer to all of these questions was unmistakeably yes. The book in which he did so, *The expression of the emotions in man and animals*, published in 1872, was an immediate bestseller – 9,000 copies sold in London in the first four months after it was published. By his own account, most people in Darwin's time believed facial expressions to be universal despite little evidence to that effect. Darwin obtained new evidence supporting the universality of some expressions by asking those who travelled in different countries to answer a list of questions he'd devised about the appearance of each emotion.

But the basis for Darwin's own espousal of the universality of facial expressions was weak. For example, in the questions he set about people in different cultures, he gave the answer he was expecting: 'is astonishment expressed by the eyes and mouth being opened wide, and by the eyebrows being raised?'.[1] He should have asked simply, what emotion is shown when the eyes and mouth …

For most of the twentieth century, Darwin's book on expression was ignored. Instead, most social and behavioural scientists[2] came to believe that facial expressions, far from being universal, were unique and specific to each culture. If beliefs, attitudes, values, personality and psychopathology were all the product of child development, which themselves varied with social class and culture, how could emotion, a vital part of social life, not also be totally shaped by the same forces? But the cultural relativists had no better evidence for their widely accepted views.

Only in the last thirty years has there been careful, scientific study about whether or not there are universals in facial expressions of emotion. This new evidence strongly supports Darwin, but the argument against universals continues unabated. Let us first consider the evidence and the arguments against it, and then why it is still so difficult for many social scientists to accept an evolutionary view of emotional expression.

My colleague Wallace Friesen and I used one of Darwin's methods – showing photographs of expressions to people and asking them to judge what emotion it showed. Darwin did this only in England. We and, quite independently, Carroll Izard,[3] and later other scientists, showed photographs to people in more than twenty different countries encompassing Western and non-Western cultures. In every instance, the emotion selected by the majority in one culture was the same emotion selected by the majority in every other culture. Expressions were labelled with the same emotion word (translated, of course) in every culture, just as Darwin had predicted. There was never an instance of disagreement that would seriously challenge universality. It never happened, for example, that the majority in one culture labelled a photograph as say, sadness, when the majority in another labelled it as say, anger.

'What impels our emotional behaviour is not simply a product of our own lives, and what we have found to be adaptive, but also reflects what has been adaptive in our ancestral environment'

Ray Birdwhistell, an anthropologist who had earlier written[4] about how his own observations led him to conclude that Darwin was wrong, came up with an ingenious challenge to this very strong evidence. It was not evolution that was responsible for our results, but Charlie Chaplin and John Wayne, Birdwhistell declared. All the people we had studied had been exposed to the same mass media–movies, magazines and television. Everyone might have *learned* the same expressions from the media. The only way to answer Birdwhistell's challenge was to study a visually isolated group who had no contact with the media. I did just that, working with a preliterate culture in the Highlands of Papua New Guinea. And I found[5] that these Highlanders associated the same facial expressions with fear, anger, disgust, sadness and enjoyment as the people in the literate cultures. I also asked other members of this culture to show us how their face would look if they found out their child had died, or they met friends, or were about to fight. They produced virtually the same expressions we see in Western cultures.

'In Darwin's time, racists argued that Europeans had descended from a different, more advanced group of ancestors than Africans. Darwin argued that universals in emotional expressions showed we are united, not divided as a species'

James Russell, a psychologist interested in the language of emotion who is committed to the view that emotion is socially constructed, charged[6] us with in some way signalling to our New Guinea subjects what response we wanted them to give. The best way to settle such a dispute was for another scientist who opposed universality to go to New Guinea and repeat my experiment. Fortunately, just that happened. The anthropologist Karl Heider and psychologist Eleanor Rosch were working among the Dani, another very isolated culture in the western part of New Guinea (now called West Irian). But after applying my research methods, these careful scientists, committed to an anti-universals viewpoint, found very strong evidence of universals![7] Russell and the others who reject universals simply ignore the work by Heider and Rosch.

In 1973, I put together a book entitled *Darwin and facial expression*,[8] reporting all the findings I have summarized here, plus other evidence in support of Darwin from studies of infants and primates. Margaret Mead's review of the book,[9] denounced its assault on cultural relativism and her protégé and friend, R L Birdwhistell. Maybe everyone interprets photographs of facial expressions the same way Mead acknowledged, but that does not mean their spontaneous expressions would be the same. Her argument seemed illogical to me. How would people know how to interpret the photographs, why would they interpret them the same way in every culture, if they had not been seeing these expressions day to day?

The best answer to Mead's challenge came from experiments with spontaneous behaviour, measuring the expressions people show rather than studying how they interpret photographs of expression. We videotaped the spontaneous facial expressions of Japanese students in Tokyo and American students in Berkeley, while they watched some

gruesome films. The camera was hidden so they did not know we were recording their reactions. In one set-up they sat alone, while in the second a scientist dressed in a white laboratory coat sat with them. When they were alone, we expected the Japanese and Americans to show the same facial expressions. But, in a social situation, we expected the Japanese to follow what we term display rules – masking signs of unpleasant emotions in the presence of an authority figure. Display rules specify who can show which emotion to whom. They are socially learned, culturally variable and, I believe, responsible for much of the widespread impression that expressions differ across cultures.

Our expectations were completely confirmed. When alone, the expressions were identical. When there was an authority figure present, there was an enormous difference between the Japanese and Americans. The Japanese masked their negative feelings with smiles, while the Americans continued to show negative facial expressions. In this one experiment we had shown the dual influence of biology and culture.[10]

Why has there has been such resistance to accepting the evidence of universals in facial expression of emotion? The universality findings contradict the Lockean view of human beings which has dominated social thought in Western countries and in the former Soviet Union. We cannot be blank slates, upon which family, culture and state can write their messages unimpeded, if something as central to our social life as emotion is not completely the product of our environment.

The finding of universals in facial expressions of emotion is important in a number of ways. First, and most fundamentally, it means we must recognize that we are biosocial creatures. To understand this vital aspect of our social lives, we must consider not just nurture, but nature; not just learning, but our evolutionary history. What impels our emotional behaviour is not simply a product of our own lives, and what we have found to be adaptive, but also reflects what has been adaptive in our ancestral environment. Without an evolutionary perspective we can not understand emotions, and why we act the way we do when we experience fear, anger, sadness and so forth, any more than we could understand our emotional behaviour if we could not appreciate how we learn from experience.

Universals in facial expression is relevant to a second issue of huge importance. In Darwin's time, racists argued that Europeans had descended from a different, more advanced group of ancestors than Africans. Darwin argued that evidence for universals in emotional expressions was counter to such a racist account, and showed all human beings had common ancestors. That we are united, not divided as a species.

'Can we understand a foreigner's emotional expressions without first attending a facial language school which tutors us in what expressions mean in their culture?'

The fact that our universal expressions of emotion are found in some other animals as well, was important to Darwin, and should be important to us. We are not the only animals to experience fear, pleasure, pain, anger or sadness. This basic tenet of evolutionary thinking, the continuity of the species, may also make us a bit uncomfortable in our dealings with other animals. It asks that we recognise that the animals we cage in zoos and experiment upon may not only show some of the same expressions, but may also experience some of the same feelings.

On a more practical level, evidence of universals has implications for how we communicate with those who differ from us. If people are not trying to mask or suppress their emotions, then their expressions will be understandable to us no matter what the race, culture, language, age or sex of the person who shows them. That is a big 'if', however, for we often follow display rules in social life to manage and disguise our emotional expressions, and these do vary with age, sex, social class and culture.

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Notes

1. Darwin C, *The expression of the emotions in man and animals*, Philosophical Library, New York 1955 (originally published 1872).
2. Bruner JS, and Tagiuri R, The perception of people, in Lindzey G, ed, *Handbook of social psychology*, Addison Wesley, Reading, Massachusetts 1954; vol 2, pp 634–54.

   Hunt WA, Recent developments in the field of emotion in *Psychological bulletin* 1941; vol 38, pp 249–76.

   Klineberg O, *Social psychology*, Holt, New York 1940.

   Landis C, Studies of emotional reactions II: general behavior and facial expression in *Journal of comparative psychology* 1924; vol 4, pp 447–509.

   Leach E, The influence of cultural context on non-verbal communication in man in Hinde R, ed, *Non-verbal communication*, Cambridge University Press, Cambridge 1972.
3. Izard C, *The face of emotion*, Appleton-Century-Crofts, New York 1971.
4. Birdwhistell RL, *Kinestics and context*, University of Pennsylvania Press, Philadelphia, Pennsylvania 1970.
5. Ekman P, Universals and cultural differences in facial expressions of emotion in Cole J, ed, *Nebraska symposium on motivation*, University of Nebraska Press, Lincoln, Nebraska 1971.
6. Russell JA, Is there universal recognition of emotion from facial expression? A review of cross-cultural studies in *Psychological bulletin* 1994; vol 115, pp 102–41.
7. Heider K, reported in Ekman P (see 5).
8. Ekman P, ed, *Darwin and facial expression: a century of research in review*, Academic Press, New York 1973.
9. Mead M, Review of Darwin and facial expression in *Journal of communication* 1975; vol 25, pp 209–13.
10. Ekman P (see 5).

Homicidal tendencies

Martin Daly and Margot Wilson†*

Every year, tens of thousands of people are murdered in private conflicts. Bar room contests of masculine honour become lethal, women are slain by scorned husbands and lovers, and children are fatally assaulted by angry guardians.

To understand why such violent conflicts arise we need to understand the sources and substance of individual self-interests. There is both good news and bad on this intellectual front. The good news is that scientists have been developing, testing and refining the requisite body of theory for decades, with the result that it is now sufficiently sophisticated, unanticipated and well verified to be of real value to criminologists and other social scientists. The bad news is that few social scientists are aware of these developments because they have taken place in the terra incognita of evolutionary biology and ethology (the science of character-formation in human behaviour).

The killing field

Homicides provide a particularly valuable window on the psychology of interpersonal conflict. Whereas the validity of most social scientific

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means of measuring antagonism, hostility and violence must be suspect, lethal assault is relatively easy to study. Because bodies are usually found and the circumstances at least minimally investigated, a sample of homicide cases does not suffer from biased detection or reports.

Before Darwin, the adaptive complexity of living creatures could only be interpreted as reflections of the incomprehensible aesthetic preferences of one (God) or more creators. Darwin radically reinterpreted biological adaptations as components of reproductive strategies, a view that endured unamended for more than a hundred years. Then, in 1964, the British theoretical biologist WD Hamilton pointed out that personal reproductive success is not really the fundamental criterion of success or failure in the evolutionary sweepstakes. The more basic criterion is one's impact on the replicative success of one's phenotypic and genotypic elements, whether in direct descendants or not. If you don't have children, for example, you might strive to leave a cultural or political legacy, some evidence of influence whether over friends and associates or larger social groups.

Any one of Queen Elizabeth's genes has a fifty per cent chance of having a descendant copy in her daughter Anne. It also has a fifty per cent chance of being represented in the Queen's sister Margaret by virtue of descent from the same parental gene. Anne and Margaret are equally related to Elizabeth, and equally likely to share any of her heritable traits. Any child of Margaret's would provide exactly the same expected contribution to Elizabeth's long-term genetic posterity as would a child of Anne's. Hence, it is at least possible for selection to favour sisterly (and fraternal) as well as maternal beneficence.

Hamilton's 'inclusive fitness' theory formalised and generalised this 'nepotistic' logic, providing the single most important stimulus to recent theory and research on social evolution. By extending the concept of fitness, Hamilton solved the problem of accounting for the evolution of altruistic actions that reduce an individual's expected reproductive success while enhancing someone else's. Inclusive fitness theory has replaced the classical Darwinian conception of organisms as evolved reproductive strategists with the notion that they have evolved to be nepotistic strategists.

One implication of Hamilton's theory is that any socially complex species is likely to possess psychological adaptations tending to soften potentially costly conflicts among genetic relatives. If my rival in a contest for a limited resource is my brother, it makes less difference to my fitness who wins than if the rival were unrelated, so the benefit of victory is diminished.

Moreover, the cost of using dangerous competitive tactics is higher in the case of fraternal rivalry since injury to either party damages the fitness of both. Research on non-human animals has confirmed the expectation that evolved social psychologies will respond to cues indicative of close kinship by turning down the heat of conflict.

'A substantial proportion of children killed by genetic parents, but virtually none of those killed by step-parents, are slain in the context of a suicide, and the distraught parent may even construe the homicide as a rescue'

There is no obvious reason why human beings should be an exception. And yet that is what our species would seem to be when one reads media reports and professional literature on family violence. There, it would appear, far from being relatively subdued, violent conflicts with kin are the norm.

According to Richard Gelled and Murray Straps, probably the best known and most widely consulted experts on family violence in North America, 'the family is the most frequent single locus of all types of violence ranging from slaps to beatings, torture and murder … (violence) is at least as typical of family relations as is love'. We began our studies of human violence in the late 1970s, and as animal behaviourists and evolutionists, we found such claims astonishing. Could the human animal really be so exceptional as to be exempt from the principle of Hamiltonian nepotism? Could kinship actually exacerbate violent conflict in this one remarkable species? These things seemed unlikely and our initial scepticism has proven to be well founded.

Killing by numbers

In those days, criminologists routinely categorised relationships into just three categories: strangers versus acquaintances versus relatives (or an even broader third category of intimates). We thought it important to make some further distinctions. We began our homicide research in Detroit, an American city with three advantages for our purposes: it was handy to our Canadian home, the police department was exceptionally receptive to research, and there were more homicides in Detroit in any given year than in all of Canada.

By constructing a data archive from Detroit police records we were soon convinced that lethal violence in the United States is not such a family affair after all. Only a quarter of the victims of solved homicides had been slain by relatives, the majority of whom were spouses. Step and in-law relationships also featured prominently. The upshot was that victim and killer were genetic relatives in just six per cent of solved cases (the figure is almost certainly lower in those remaining unsolved). Subsequent research has indicated that these proportions are fairly typical of homicide in the United States as a whole.

This six per cent figure is not particularly meaningful, except as a corrective to common misperceptions. Where the homicide rate is lower, the proportion of solved cases in which victim and killer are blood kin tends to be higher. In Britain in recent decades, for example, our analyses of Home Office data indicate that this figure is sixteen per cent. This does not mean that the British are likelier to kill their kin than are Americans. Detroiters in fact kill blood kin at a per capita rate twelve times higher than that of contemporary Britons. They also kill non-relatives at a rate which is a phenomenal forty times higher than the British, so the kin cases are proportionately fewer.

These numbers in themselves neither support nor refute the idea that the human social psyche is functionally nepotistic. People indeed kill relatives, and in certain societies such cases can constitute a substantial proportion of all killings. But substantial compared to what? The question is whether kinship mitigates the risk of violent conflict when other things are equal. But other things never are equal and it is difficult to say what fraction of homicides we should expect to be

intrafamilial if kinship were irrelevant, as criminologists had implicitly assumed.

End of the family affair

Mainstream criminology has had virtually nothing to say about kinship. The only theoretical approach that seems to be of any relevance to the question of expected distribution of victim–killer relationships is the prevalent model of opportunity in relation to routine activities. According to one expert witness before a US Presidential commission on the causes and prevention of violence, when questioned on why intimates commit violence against one another: 'Perhaps the most powerful, if crude answer is because they are there … It cannot be surprising that more violence is directed against those with whom we are in more intimate contact. We are all within easy striking distance of our friends and spouses, for a goodly part of the time.'

Some of the best criminological research was, and still is, being conducted in a routine-activities framework, so this provides a serious test for the Darwinian opportunity model. But the problem of estimating a potential killer's access to potential victims in various relationship categories is formidable. One approach is to confine analysis to a tractable limited domain, such as those cases in which the two parties were members of the same household. Information on the living arrangements of the population at large can then be used to specify the universe of potential victim–killer pairs, and relationship-specific rates can be computed. We were able to perform such an analysis of the Detroit homicides.

Kin are more likely to live together, and to that extent it may be more likely that violence will be directed against people with whom we are in intimate contact. But in our analysis of Detroit homicides we found that genetically unrelated people who lived in the same household experienced a homicide rate more than eleven times greater than did co-residing blood kin. This much greater level of violence was just as true of unrelated roommates and boarders as of marriage partners. Thus, our emphasis on the relative rarity of lethal violence among

blood kin is not easily dismissed as a convoluted way of referring to some special capacity for violence in marital relationships.

Another noteworthy point is that although our statistical analysis conflated step and in-law relationships with genetic relationships (because population data were inadequate for making these distinctions), stepfathers were implicated in half of the cases in which children were killed by 'parents'.

Opportunity models knocked

In general, then, the facts about homicide in Detroit are inconsistent with a simple opportunity model, but fully consistent with the Hamiltonian proposition that genetic relationship is associated with a reduction in

conflict and violence. There is no reason to believe that Detroit is unusual in this regard. Actually, the expert quoted above went on to propose that intimates must be the victims of an even larger share of violence than simple access would predict because a more satisfactory opportunity model would incorporate the intensity as well as frequency of interaction. But this more complicated opportunity model is even further from the facts.

> 'To everyday folk psychology, decisions are the product of deliberation by conscious human beings. Unfortunately, people do not necessarily enjoy privileged insight into the determinants of their own decisions and seemingly reasoned choice can be illusory and reconstructive'

Other sorts of analyses also support the view that kinship matters for reasons that cannot be reduced to mere opportunity. Consider the distinction between collaborators and antagonists. Opportunity variables such as the frequency and intimacy of interactions should affect cooperative and conflictual interactions in parallel. If relationship distributions in homicide cases were due merely to opportunity, then we might expect that the distribution of relationships between persons collaborating in a homicide should be similar to the distribution of relationships between victims and their killers. We have compared these distributions in every relevant data set we have been able to lay our hands on, including anthropological and historical materials from a wide range of societies, and the results are always essentially the same. Close genetic relationships are far more prevalent among collaborators in violence than among victim and killer, and the reverse is true about in-laws.

A good deal of other evidence also confirms this evolutionary interpretation. Even in social systems in which brothers are one another's principal rivals for familial lands and titles, there is evidence that close genealogical relationship softens otherwise equivalent conflicts and reduces the incidence of violence. The largest data set bearing on this

issue is a British one, but it is not the Home Office's contemporary homicide archive: the homicide rate in thirteenth century England was similar to that prevailing in American urban ghettos today. Norman justice was such that there were strong incentives to divulge killings to the travelling justices, so it is likely that the judicial proceedings in the circuit courts captured a large proportion of all cases. These rolls survive in the Public Record Office in London, and the historian James Given has assembled a superb archive of several thousand cases from them. A peculiarity of thirteenth century homicide in England was that two or more people were identified as co-offenders in more than a third of all cases, affording a very large sample for comparison with the distribution of victim–killer relationships. As we expected, the two distributions are radically different: 15.2 per cent of co-offender pairs were genetic relatives compared to just 2.3 per cent of victim–killer relationships. In-laws, by contrast, constituted more than twice as large a proportion of victim–killer pairs than of co-killers. A thirteenth century Englishman was far less likely to kill his brother than to collaborate with that brother in murdering a non-relative, but the same could not be said about his brother-in-law.

'A maxim like 'don't get mad, get even' is grounded in confusion: getting mad evolved as a means to the end of getting even'

We have discussed opportunity models as if they were alternatives to Hamiltonian nepotism, but they need not be. Kinship cannot be apprehended magically; nepotistic allocations of benefits depend on cues of kinship, and those cues might be the very ones invoked as determinants of behaviour in an opportunity model. Many animals indeed recognize their kin on the basis of mere exposure, for example, but that usually means exposure at a very specific life stage. If one's nestmates are reliably one's siblings in a given species, then one may learn the individual identities of putative siblings in infancy and continue to treat them preferentially throughout life, even if some rare

mishap has uncoupled genetic relatedness from infantile familiarity. But mere exposure at any and all life stages is unlikely to be an even remotely reliable cue of kinship, and it is certainly not the basis of human cooperativeness and conflict. The Detroit data, the thirteenth century English data and many other analyses are unanimous in this implication: familial solidarity in Homo Sapiens cannot be reduced to a mere consequence of proximity and familiarity.

The truth about Cinderella

Parental efforts and investments are valuable resources and selection favours those parental psyches that allocate effort effectively to promote fitness. The adaptive problems that challenge parental decision-making include both the accurate identification of one's offspring and the allocation of resources among them with sensitivity to their needs and abilities to convert parental investment into fitness increments. A mistake in identification can obviously incur a huge natural selective penalty, and countless animals have been found to be sensitive to species-appropriate cues that help parents avoid squandering resources on non-relatives. Nevertheless, parents can be deceived, especially since selection is also acting on those unrelated usurpers to evolve means of bypassing parental defence. Bramblings and pipits have evolved to detect and reject other species' eggs in their nests, for example, but the two lineages of cuckoos that parasitise them have responded evolutionarily with eggs that mimic those of their respective hosts.

> 'Had Freud better understood Darwin, the world might have been spared such dead end fantasies as death instincts and Oedipal desires'

More puzzling than such deception are instances in which adults who have access to reliable cues of non-parenthood take on parental duties nonetheless. In the animal kingdom, this happens mainly after forming a new mateship with someone who already has dependent

young. In many species, such young are likely to be killed, but in species in which the single parent has some leverage, the replacement mate may assume the role of step-parent, with varying degrees of effort and enthusiasm. And Homo Sapiens is clearly such a species: new mates make pseudo-parental investments in their predecessors' children as part of the reciprocal exchange involved in courting and establishing a relationship with the lone parent.

'Steep discounting of the future is just what a properly functioning evolved psyche might be expected to do in the sorts of social and material circumstances that are especially likely to foster violent crime'

Human step-parents invest considerable effort and may even come to love their wards. But it would be surprising if the psychology of genetic parenthood were fully committed in this situation. It is adaptive and normal for genetic parents to accept non-trivial risks to their own lives in caring for their young, but selection presumably favours much lower thresholds of tolerable cost in step-parenting. Stepchildren are seldom or never so valuable to one's expected fitness as one's own off-spring would be, and those parental psyches that are easily parasitized by just any appealing youngster must always have incurred a selective disadvantage. Little wonder, then, that the exploitation and mistreatment of stepchildren is a thematic staple of folk tales all around the world. And little wonder, too, that step-parental obligation demonstrably enters into remarriage decisions as a cost, not a benefit, with dependent children from past unions both detracting from the single parent's marriage market value and raising the chance that the remarriage will fail.

What of step-parents? One might suppose that child abuse researchers would have needed no prompting from Darwinists to wonder whether there might be a factual basis for Cinderella stories. Surely they should have assumed that parents are more likely to neglect, assault, exploit and otherwise mistreat their stepchildren than their genetic children – and

then ask just how important a risk factor this is. Surprisingly, however, in the explosion of child abuse research that followed paediatrician Henry Kempe and collaborators' agenda-setting proclamation of a battered-child syndrome in 1962, this seemingly obvious question was simply never raised. The first published study addressing it was our 1980 demonstration that stepchildren constituted an enormously

higher proportion of child abuse victims in the United States than their numbers in the population at large would warrant. Subsequent research by ourselves and many others has shown that this excess risk is cross-nationally and cross-culturally ubiquitous.

It is an initially plausible hypothesis that the high incidence of step families in child abuse samples might be an artefact of blased detection or reporting. However, analysis of homicide cases indicates that the differences are genuine and massive. The youngest children rarely have step-parents, but when they do studies in Canada, Britain and the United States indicate that their risk of being fatally abused is on the order of fifty to a hundred times higher than the risk when at the hands of a genetic parent. Having a step-parent has turned out to be the single most powerful predictor of severe child maltreatment yet discovered.

Demonstrations of differential risk do not, of course, prove that step-relationship itself is the relevant risk factor. It might instead be an incidental correlate of some more directly relevant factor. To date, however, all such hypotheses have failed. There are good evolutionary psychological grounds for predicting that both poverty and maternal youth might be risk factors for child maltreatment, for example, and indeed they are, but they are distinct risk factors whose effects do not account for the step-parent effect. Neither can the effect be accounted for by an over representation of generally violent personalities among remarried persons, since abusive step-parents have been found to be discriminative, sparing their own children within the same household.

The great majority of step-parental abuse and homicide cases with which we are familiar were perpetrated by men. It is not clear, however, that stepmothers constitute a lesser threat. Like stepfathers, stepmothers are clearly over-represented as child abusers in comparison to their genetic parent counterparts, but so few small children actually live with stepmothers that we have not been able to generate reliable rate estimates.

'The homicide rate in thirteenth century England was similar to that prevailing in American urban ghettos today'

Homicides perpetrated by stepfathers differ from those by genetic fathers not just in their incidence, but in qualitative attributes too. In both Canada and Great Britain, for example, we have found that a substantial proportion of the children killed by genetic parents, but virtually none of those killed by step-parents, are slain in the context of a suicide, and the distraught parent may even construe the homicide as a rescue. Moreover, step-paternal cases are especially likely to involve a violent, assaultive rage reaction: most small children killed by stepfathers are beaten to death, whereas genetic fathers are relatively likely to have disposed of the child by gunshot or asphyxiation.

Infants are taxing. They wail and soil themselves and can be hard to soothe. But the very commotions that can grate on the nerves of bystanders are likely to evoke only attentive concern from a committed parent. Potentially damaging, angry responses are inhibited by parental love, an evolved psychological adaptation that makes the efforts of child rearing tolerable and even delightful. Step-parents assuredly vary in their degrees of personalized affection for the children, as do genetic parents, but it is equally sure that the average step-parent loves the childless.

As we would anticipate from the argument that excess risk derives ultimately from a lesser commitment to that individual child's welfare, step-parents are over-represented in all forms of child maltreatment from neglectful as well as assaultive cases, and in sexual misuse too. We conclude that the higher rates of neglect, exploitation, assault and murder incurred by stepchildren are the most dramatic but by no means the only consequences of a difference in the distributions of parental and step-parental affection.

Evolving hypotheses

Space does not permit us to discuss the facts about spousal homicide or those rare cases in which victim and killer are close genetic relatives. Suffice it to say that evolutionary thinking has guided our discovery of a number of hitherto unsuspected risk factors and demographic patterns in these types of cases too.

Evolutionists often generate alternative hypotheses that cannot simultaneously be true. When we began studying spousal homicide, one of us (Daly) hypothesised that wives would incur increasing risk with age because their declining reproductive value would reduce their husbands' regard for them. The other (Wilson) proposed instead that uxoricides are largely to be understood as maladaptive by-products of coercive and proprietary inclinations that husbands feel most extremely when their wives are young. Although it has proved difficult to separate the effects of female age from the correlated effects of male age, marital duration and parity, it is now clear that Wilson's hypothesis was much closer to the facts than Daly's. Young wives incur the greatest risk and this is not an incidental consequence of the fact that they tend to be married to young husbands.

We are not embarrassed that our evolutionary perspective inspired these alternative hypotheses. For one thing, no one without such a perspective had ever thought to ask how rates of spousal homicide might vary in relation to the marital partners' ages. But there is a more basic point. Evolutionary psychology is commonly portrayed, by both enthusiasts and critics, as another addition to the Babel of rival psychological theories and systems. This is wrong. What evolutionary psychology aspires to become is a Kuhnian paradigm shift. In conducting this research, we were certainly not testing Darwinian theory, nor even testing its applicability to human social behaviour. We know, as surely as scientists know anything, that living things and their attributes have evolved, and that in so far as those attributes exhibit complex functionality, their properties have been shaped over many generations by selection. Whatever the results of ours and any other research, we can be sure that evolved psychological adaptations are behind them.

Homicide outside the family

We have devoted much of our attention to the minority of homicides that are intrafamilial precisely because they seemed the most challenging from a Darwinian perspective. But most killers are not related to

their victims, either by blood or marriage, and an evolutionary psychological approach sheds considerable light on these cases too.

Universally, men kill unrelated men vastly more often than women kill unrelated women. Criminologists and other social scientists have offered a wide range of hypotheses to explain sex differences in the use of lethal violence, but all invoke local aspects of particular societies and therefore provide no explanation for the phenomenon's cross-cultural generality.

'If it were generally the case that fear, anger, jealousy and other emotional states interfered with our capacities to make decisions that furthered our interests, we would have evolved to be affectless zombies'

Sex-differential violence appears to be one of many manifestations of the fact that the human male psyche has evolved to be more risk-accepting in competitive situations than the female psyche. Our sex difference in intrasexual violence is one we share with other species with polygynous mating systems, species in which the variance in fitness among males exceeds that among females. The evidence that human beings evolved under a mild degree of effective polygyny is abundant and consistent, and the natural selective link between such a mating system and sex differences in competitive violence is well understood and uncontroversial. Basically, greater fitness variance selects for greater acceptance of risk in the pursuit of scarce means to the end of fitness. Furthermore, being 'recklessly' prone to life-threatening risk-taking is especially likely to evolve where staying alive by opting out of competition promises to yield no fitness at all and is therefore the natural selective equivalent of death.

Lethal violence between unrelated men is transparently competitive. 'Competition' refers to any conflict of interests in which one party's possession or use of a mutually desired resource precludes another's. Robbery homicides are unequivocal instances, as are many sexual triangle cases. More subtle examples are the 'face' and 'status' disputes that constitute a very large proportion, perhaps the majority,

of all homicides in the United States. The social resources contested in these cases are limited means to the end of more tangible resources. And not all conflicts are competitive. If a woman spurns one suitor for another, for example, then she and the rejected suitor have a conflict of interests, but they are not competitors, whereas the male rivals are. In general, competition is predominantly a same-sex affair because same-sex individuals are usually more similar in the resources they desire than opposite-sex individuals.

The rate at which men kill unrelated men is the most variable component of the overall homicide rate which is why intrafamilial cases constitute an increasing proportion of all homicides as overall rates decline. The incidence of such male-male killings in a given time and place can be interpreted as a reflection of the local severity of male-male competition. One attractive hypothesis that has yet to receive a good test is that conditions or policies that promote stable monogamy will tend to reduce both the gross homicide rate and the sex difference. A better established hypothesis is that inequity in the distribution of material resources is an important source of cross-national variation in homicide rates. The United States has by far the most inequitable income distribution in the modern west and by far the highest homicide rate. Even if one confines comparisons to western European nations, inequity – measured, for example, by the Gini index – is a significant predictor of the homicide rate.

No tomorrow people

There is considerable evidence that people who engage in risky criminal activities 'discount the future'. Such inability to delay gratification is usually interpreted as a sign of immaturity and pathology, but this seems to us unduly pejorative. The psychological and behavioural tendencies that are disparaged as indicative of a 'lack of impulse control' actually sound a lot like adaptive adjustment of risk acceptance. Steep discounting of the future is just what a properly functioning evolved psyche might be expected to do in the sorts of social and material circumstances that are especially likely to foster violent crime.

Something that ought to affect discounting of the future is information bearing on the likelihood that the future will ever come. Reason to doubt that you'll be alive tomorrow is reason to grab what you can today. An increase in mortality in one's reference group increases the appeal of risky action in pursuit of quick returns, especially if the sources of that excess mortality are independent of the actor's choices. But what sort of evidence would bear on such risk adjustment? One possibility is some sort of semi-statistical apprehension of the distribution of local life spans. This need not be so complex as it sounds. If a young man's grandfathers were both dead before he was born, and more than a couple of his primary school classmates are already dead too, and grey haired men stand out in his neighbourhood by virtue of their rarity, there may be something going on that he should attend to.

Our research in progress suggests there are large variations in life expectancy between neighbourhoods in a major American city and that expected future life span is a very good predictor of homicide rates, even if it is computed with the mortality effects of homicide itself removed. More traditional measures of poverty are highly correlated with both expected life span and homicide, but expected life span is at least as good a predictor as any other. Whether readiness to commit violence is indeed affected by the sorts of life expectancy cues suggested above is a question for future research.

One last misconception about evolutionary psychology needs rebuttal. It is often suggested that evolutionists are reactionary supporters of the status quo. In fact, those seeking ideological support for policies whose beneficiaries are the rich and privileged will have to look elsewhere. Evolutionary psychological theory and research come down firmly in support of the proposition that inequity and desperation are the principal, remediable causes of crime and violence. This is true not only because people are obsessive about social comparison and escalate their competitive tactics when they're losing out, but also because purely punitive crime control without remediation of inequity and desperation, actually invites increased recklessness.

There is not and never was any basis for social Darwinism in evolutionary theory. If the principle of natural selection 'justifies'

laissez-faire capitalism, it also justifies the plague by exactly the same logic and to exactly the same extent.

This article draws on work more fully covered in the authors' book, *Homicide* (Aldine de Gruyter, Hawthorne, NewYork 1988).

An evolutionary reading of conflict

The evolutionary view is that perceptions of self-interest – and that may include systems such as the immune system which operate beyond our awareness – reflect how genetic posterity was pursued in ancestral environments.

The different subsystems that humans are made of, including respiration, earning, digestion, visual analysis, killing parasitic microorganisms and so forth, are composed of distinct bits of anatomical, biochemical and psychological machinery which are all evolved to contribute to the single end of manufacturing additional, similar people. Success in doing so was the sole criterion by which Darwin's demon, natural selection, accumulated its complex functionality.

Selection is the differential reproductive success of alternative phenotypic designs – that is, the characteristics which make up an individual or group both in terms of their gene set and environmental experience – with regard to the rest of the population and other broad evolutionary parameters such as sex. What selection favours is any attribute that enables individuals to out-reproduce members of the same sex and species.

It's elementary

Adaptationist thinking is a ubiquitous and inescapable element of all life sciences. Assumptions and hypotheses about adaptive function pervade

psychology, for example, for the same reason that they pervade physiology: because the mechanisms under study are obviously organised in such a way as to achieve something. All psychological investigation is guided by conceptions of what that might be, whether detecting signals and making social comparison, or reducing frustration and maintaining self-esteem. Unfortunately, adaptationist thinking in psychology has often failed to make use of contemporary understandings of evolution by selection, the process that creates adaptations. Had Freud better understood Darwin, for example, the world might have been spared such dead end fantasies as death instincts and Oedipal desires.

Psychologists have long been aware of hierarchies of function. Lateral inhibition in the retina, for example, is interpreted as a means to the end of edge detection, which is a means to the end of object recognition, which is a means to the ends of foraging and predator avoidance, which are means to the ends of energy accrual and survival. But psychologists have wandered down innumerable garden paths by imagining that the summit to this hierarchy of functions – the end to which all of the organism's immediate objectives are subsidiary – is homoeostatic quietude, personal growth, longevity, the reproduction of the species, or even death. What people and other organisms are organised to achieve is none of these. It is Darwinian fitness.

Exercising Darwinian fitness

In general,our human appetites and aversions have evolved to motivate behavioural choices with the best expected fitness consequences in ancestral environments. For instance, sweet tastes acquired their appeal because they were useful indicators of valuable nutrients. Infidelity of one's mate is aversive because of its threat to fitness. Fitness is nothing more than the selection of behaviour which promotes the best chance of reproducing your genes.

We stress ancestral environments because the human animal's evolved psychology and physiology are historical artefacts, designed by a natural selective process that requires persistent relationships between cue and consequence over many generations.

But when environments change rapidly, evolved psychological mechanisms will not necessarily promote fitness, even on average. Mechanisms whose function is the detection of nutrients can be deceived by evolutionarily novel substances like saccharine. Mechanisms whose function is the assessment of a potential mate's fertility can be deceived by evolutionarily novel cosmetic interventions.

It is easy to attribute psychophysiological phenomena like sweetness detection to evolution by selection, and easy to grant selection's relevance to basic preferences such as aversion to pain. But many baulk at the notion that selection has also shaped the complex structures of the seemingly more voluntary and rational processes by which we choose and execute the means to gain our ends.

Decisions, decisions

Evolutionists routinely model the costs and benefits of alternative 'decision rules' about, say, how many eggs a bird should lay before incubating them and rearing the chicks, or when a plant should stop channelling all its accrued energy into further growth and start putting some into reproduction. These determinations are aptly termed decisions in so far as they are complexly contingent on environment information that usefully (though imperfectly) predicts relevant future conditions.

To everyday folk psychology, decisions are the product of deliberation by conscious human beings. Unfortunately for this folk conception, however, experimental psychologists have demonstrated repeatedly that people do not necessarily enjoy privileged insight into the determinants of their own decisions, and that the phenomenology of deliberation and reasoned choice can be illusory and reconstructive. Psychology experiments in which causal determinants of choice have been controlled by the experimenter elicit explanations from observers, and from the decision-makers themselves, that are coherent and plausible but demonstrably incorrect. For example, people might give an elaborate explanation for why they liked one film sequence more than another when their preferences were best accounted for by

white noise levels manipulated by the experimenter. This retrospective theorising doesn't lead us just to misperceive the reasons for our actions. It also lead us to misrecall our pasts, sometimes dramatically.

The mental machinery that has evolved includes emotions, and one of the most mischievous false dichotomies in folk psychology is surely that of reason versus emotion. Emotional states are functional operating modes which include design features that make it easy to respond to situations. A maxim like 'don't get mad, get even' is therefore grounded in confusion: 'getting mad' evolved as a means to the end of getting even. If it were generally the case that fear, anger, jealousy and other emotional states interfered with our capacities to make decisions that furthered our interests, we would have evolved to be affectless zombies. The very fact that we have not is testimony to the functionality of emotional states.

Once the complexity of the psychological machinery generating even our so-called rational choices is acknowledged, it no longer seems odd to speak of a physiological decision about when to ovulate, or to refer to choice points in growth and development, using the same language we apply to the process that selects certain behaviour.

The crossroads of conflict

The idea that expected fitness is the bedrock of self-interest gives a clue as to where interests intersect and where they diverge. For instance, take two creatures with interests that intersect to the degree that the exigencies that would enhance one party's expected fitness would also enhance the other's. We might expect both creatures to generally perceive their interests as harmonious (an example would be the case of monogamous mates with shared interests in several joint off-spring). Conversely, two creatures are as likely to perceive their interests as discordant, and hence to experience conflict to the degree that the exigencies that raise one's expected fitness diminish the other's. Each party suffers when the other actively promotes its self-interest and inclinations to thwart one another are probable (an example in this case might be rivals for the same mate).

Long live society

Oliver Curry

Inequality, perceived as much as real, can literally be the death of us. Evolutionists argue there is scientific evidence as to why it is the harbinger of crime, pessimism and moral breakdown.

So strong are the assumptions on which evolutionary psychology is based, that, as yet, the endeavour has been largely free of the splits and factions characteristic of many other sections of academe. Indeed, the 'universal acid' of Darwinian theory, to use Daniel Dennett's phrase, would appear to be engaging and engulfing the social sciences – not least because it provides the theoretical underpinning for more traditional research into social relations and human behaviour.

One luminous example of the potential of Darwinian approaches can be found in the work of Richard Wilkinson, an economic historian and epidemiologist based at the University of Sussex. His recent book, *Unhealthy societies*, claims to explain why levels of disease and mortality rates differ widely among developed countries irrespective of their material standards of living.

Journalist and editor of *the evolutionist* based at the London School of Economics.

'It is income distribution and the level of inequality in a society – and more importantly, the perceived relative standing of its members – that is the best indicator of that society's health'

He argues that after societies reach the epidemiological transition – when infectious diseases give way to degenerative illnesses as the major causes of death – increases in levels of material wealth have rapidly diminishing returns for public health. In fact, quoting work by the demographer Sam Preston, he concludes that only about twelve per cent of the increase in life expectancy over the last few decades is related to a real rise in the standard of living. Life expectancy has increased in the developed world, but has done so faster or slower according to whether income differences are widening or narrowing. It is income distribution and the level of inequality in a society – and more importantly, the perceived relative standing of its members – that is the best predictor of that society's health. Studies from the US, for example, have unequivocally shown this to be the case, with a 0.7 correlation between inequality and average population mortality rates across the fifty states. Inequality manifests itself not only in terms of poorer health – with cardiovascular diseases, infections, respiratory diseases and cancers all showing an increase – but also in ways regarded by Wilkinson as symptomatic of a society falling to bits. That is, the increase in the number of accidents, murders and drug/alcohol related deaths (which respond most sensitively to widening income differences).

The effects of inequalities are even more striking when viewed from an individual level. Wilkinson quotes the *Whitehall study*, in which heart disease among civil servants was shown to correlate more strongly with employment grade than other obvious causes such as poor diet or smoking. Death rates at the bottom are three times higher than among those at the top. The risk of mortality was also shown to correlate with the amount of control officials had over how and when they did the work assigned and the level of support both from colleagues and at home. For Wilkinson, this illustrates the importance of the social

environment to human well-being. He argues that hierarchical forms of social interaction are disproportionately damaging to those at the bottom. Psychosocial factors such as lack of control and lack of social support are killers, whereas friends, intimates and collaborators are the best defence against stress and its ill effects. In a wider context, other studies have shown that greater investment in social capital, as measured by the degree of participation in community associations and the level of interest in local affairs, has strongly positive effects on health.

When stress is understood as the manifestation of the body's 'fight or flight' response, it's not difficult to see its adaptive significance. Increased blood pressure, faster respiration, higher levels of adrenaline and blood clotting chemicals all have obvious advantages when the body is under some external threat. However, this state of alert also involves a partial shut-down of the body's non-essential functions, such as growth, tissue repair and maintaining the immune system. Wilkinson argues that it is this long-term neglect of physiological maintenance that accounts for a large proportion of the illnesses related to chronic stress.

At one time, the biological discussion of the physiological link between biology and society might have stopped there, as does Wilkinson. But the modern application of evolutionary thought allows us to go further – although admittedly, at this stage, only in a speculative way. For evolutionists, it's not difficult to see why those at the bottom of the social hierarchy might feel discontented with their lot. Numerous studies have supported sexual selection theory's predictions that for a male at least, status, power and resources are the most reliable indicators of mate value and those males that possess them in abundance have significantly improved prospects of reproductive success.

In species more polygynous than humans, where the sexual spoils of supremacy are more skewed toward the victor, falling behind in the

'Inequality manifests itself not only in terms of poorer health, but also in ways symptomatic of a society falling apart: increased numbers of accidents, murders and drug/alcohol related deaths'

'Humans are born cooperators, other people being crucial to an individual's material and emotional well-being. A lack of opportunities for beneficial reciprocal exchange – such as having no friends – is experienced as a major body blow

competition for these assets is literally a matter of life and death from the point of view of natural selection. Humans are only mildly polygynous, but it would be surprising if the mechanisms of the brain designed to check these cues of status and success against others didn't ring painfully loud alarm bells if genetic oblivion loomed large. In these all-or-nothing situations, natural selection has nothing to lose by such drastic measures. If the individual concerned lacked the power to change his or her circumstances, serious damage as a result of prolonged privation would be a likely outcome. A similar physiological pattern has been found in baboons: this is interesting not so much for the physiological parallel, but because it reflects the fundamental importance of hierarchy and relative social status to health.

Humans are also born cooperators. Our relationships with other people are crucial to our material and emotional well-being. It should come as no surprise to a discipline largely kick-started by the study of social behaviour, that a lack of opportunities for beneficial reciprocal exchange – such as having no friends – should be experienced as a major body blow.

Although the idea that man is a social animal is far from new, it's one thing to talk about society in an imprecise way and to mourn its passing, and another to highlight the specific causes and consequences of social disintegration. What's refreshing about Wilkinson's work is that it gives a concrete foundation on which to judge the claims made about society by all sections of the political spectrum. In the light of these findings, it would be hard to argue that society doesn't exist. And it might shed light on why, despite successive increases in the material standards of living in Britain, the predicted feelgood factor has remained elusive.

Richard G Wilkinson is a senior research fellow at the Trafford Centre for Medical Research, University of Sussex and a visiting professor at University College, London. His book, *Unhealthy societies: the afflictions of inequality* is published by Routledge.

Note

1. Davey Smith G, Shipley MJ and Rose G, Magnitude and cause of socioeconomic differentials in mortality: further evidence from the Whitehall Study in *Journal of epidemiology and community health* 1990; vol 44, pp 265–70.

10 big challenges from the evolutionary agenda

Helena Cronin and Oliver Curry†*

The application of evolutionary theory to human psychology is a new venture, only just beginning to fulfil Darwin's promise that 'light will be thrown on man'. But already we can envisage the kinds of implications it might have…

1 The propensity to act morally is an evolved capacity designed to be responsive to the environment in which individuals find themselves.
It is time for moral punditry and guesswork to be replaced by a scientific investigation into the conditions that feed so-called 'evil'.

2 Male and female psychologies have evolved to be distinctly different in assessing the costs – indeed, the very notion – of anti-social behaviour.
Our legal system should reflect these differences if it is to promote true equality before the law.

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†Journalist and editor of the evolutionist based at the LSE.

3 What we think of as pathology might well be the body's evolved defences against disease.
An adaptive analysis of symptoms would allow us to make more judicious use of doctors' battery of ever-more sophisticated technical and pharmacological treatments.

4 Children suffer abuse or murder at the hands of step-parents at a vastly higher rate than from their genetic parents.
This potential risk is in urgent need of recognition by policy makers and social workers.

5 We have evolved to be reciprocal altruists; being nice comes naturally.
Rather than focusing on damage limitation, we could frame our social, legal and political institutions to exploit the benevolent aspects of human nature.

6 Human brains are designed to assess risks in the way that our ancestors encountered them.
If the current flood of information is to empower rather than bewilder, it should surely be presented – by lawyers, doctors, journalists, politicians or teachers – in ways that mesh with the algorithms of our evolved minds.

7 Conflict between parents and offspring is inevitable. This is because of divergent reproductive interests: the child's genes have only this bid for immortality whereas the parents could have other offspring. There is no solution that is optimal for both.
'Experts' in child-rearing need to appreciate the counter-intuitive insight that children are active agents in this struggle. Unless they do so they will continue to place unfair blame on parents for inadequate 'socialisation' or on mothers for 'withholding' maternal love.

8 Cultural inventions such as reading and writing are too recent to have been part of natural selection's design for us. Rather, they exploit existing adaptations, such as language. Only when we understand the set of adaptations that comprise the human body and mind will we be fully able to understand imperfections such as dyslexia that do not reflect specific adaptations.

9 Natural selection designed us to savour foods that were nutritious but scarce in our ancestral environment – salt, sugars, fats. But faced with unnatural abundance our preferences give rise to chronic diet-related illness – hypertension, diabetes and heart disease.
At present, government subsidies on the production of 'unhealthy' foods are putting the onus on individuals to 'choose' a healthy diet. Government should institute an integrated agriculture, food and health policy which better serves our evolved tastes.

10 The conventional annals of humanity begin almost at the end of our two million year occupancy of this planet.
How can we claim to take environmental issues seriously when this immense history is not reflected in our concept of political time?.

Book marks

The Moral Animal: evolutionary psychology and everyday life

Robert Wright

Wright is an able populariser who attempts to formalise the boundaries of evolutionary psychology's new world view, differentiating it from the so-called behavioural sciences led by sociology, anthropology and political science. He claims that a Darwinian understanding of human nature can help people choose and attain their goals.

The book is far-reaching. It includes a biography of Darwin and explores issues of marriage, family, relationships, status, deception, ethics and religion in some depth. Importantly, it includes a section on frequently asked questions, debating the 'naturalness' of homosexuality and suicide among other topics.

In some ways, Wright has provided a manifesto for evolutionary psychology, outlining with great clarity and force what it sets out to accomplish. If you are curious about evolutionary psychology or are looking to engage with its proposals, *The Moral Animal* is the place to start.

(*Little Brown, London 1994*)

The Selfish Gene

Richard Dawkins

First published in 1976, *The Selfish Gene* is a classic of modern evolutionary theory. Dawkins unites past and present, slime mould and

humanity through his central thesis, that 'we are survival machines – robot vehicles blindly programmed to preserve the selfish molecules known as genes'.

Dawkins draws on Darwin, Wallace and Mendel in describing genes as the ruthless replicators driving the evolutionary locomotive. This idea has formed the bedrock of contemporary Darwinian theory.

The book has been much misunderstood as a paean of praise for selfishness. In fact, Dawkin's aim was to offer a more realistic understanding of the conditions for, and limits to, altruistic and cooperative behaviour.

Dawkins takes us through the minutiae of his theory while never abandoning us. *The Selfish Gene* is a superbly crafted book, its argument exquisitely conceived and constructed.

(*Oxford University Press, Oxford 1989*)

The Red Queen: sex and the evolution of human nature

Matt Ridley

Matt Ridley sets out to explore two paradoxes of evolutionary theory. Firstly, if sexual reproduction only results in the replication of half of our genes, why do we continue with this inefficient method? Secondly, why do males and females look so different when there are no apparent evolutionary reasons to so do?

Ridley's answer is a dual theory of sex and sexual selection. Because we are engaged in an arms race with parasites and viruses, we have to develop new tricks in order to survive. If we didn't keep changing, we would be colonised.

Ridley's book is full of vibrant, illuminating examples. An essential text for scholar and student alike.

(*Viking, London 1993*)

The Evolution of Desire: strategies of human mating

David H Buss

How do we choose and lose our mates? What lies behind our choice of sexual partner? David Buss provides the definitive Darwinian account

of human sexuality in his study of thirty-seven cultures from around the world.

For Buss, mating strategies are universal, involving risk taking, status striving, coalition forming and the derogation of competition. Social factors certainly shift the thresholds of various strategies but only within evolutionary norms.

At times *The Evolution of Desire* reads like an advanced lovers' guide with chapters on attracting a partner, staying together, sexual conflict and breaking up. It is, however, much more than that. Buss elegantly bridges the gap between academia and the mainstream, illustrating his arguments with copious cross-cultural evidence. For those experiencing strife in their relationships or who simply want a new angle on a well-established debate, this book comes highly recommended.

(*Harper Collins, London 1994*)

The Day Before Yesterday: five million years of human history

Colin Tudge

The Day Before Yesterday provides the *longue durée* of evolutionary psychology. It is breathtakingly wide-angled, surveying over five million years of human history. Tudge pours scorn upon those who consider Roman and Greek history 'ancient'. In fact, he points out that 'conventional history starts almost at the end'. Tudge avoids the perils of historical narratives that omit context and theory by analysing both environmental change and evolutionary theories from the traditional (Darwin and Lamarck) to the contemporary (Chris Stringer).

Tudge is self-admittedly 'infused by a love of mammals', exclaiming that he finds living things' thrilling'. This enthusiasm permeates the book, providing an upbeat context to the main story. You can sense Tudge's genuine excitement to the point that it becomes hard to imagine how he composed himself to write the book at all. But overall, this passion, allied to an impressive range of expertise, ensures what Tudge himself describes as, 'a cracking yarn'.

(*Jonathan Cape, London 1995*)

Homicide

Martin Daly and Margo Wilson

Why do people kill each other? Who kills whom? Daly and Wilson provide the answers in an exhaustive study of homicide incorporating findings from a wide variety of cultures and nations.

What they uncover is of crucial importance to criminologists and psychologists alike. Homicide is shown to have several uniform features. 90% of same-sex, non-kin murders are male-male. A stepchild is up to one hundred times more likely to be murdered by a parent than a child from two biological parents.

What is dramatic about the survey is the robustness of these patterns across cultures. Unfortunately, these findings are somewhat hidden by the book's academic style and format. However, the importance of *Homicide's* conclusions and its application of evolutionary psychology to a novel subject matter will ensure its longevity and status.

(*Aldine de Gruyter, New York 1988*)

Passions Within Reason: the strategic role of the emotions

Robert H Frank

Bob Frank explodes the myth of popular Darwinism and Smithian economics that 'to be moral is to be a chump'. Instead of classifying human nature merely as the pursuit of rational self-interest. Frank shows how moral actions evolved as adapted strategies.

Frank describes the communication of emotions through reputations, signals and telltale clues. They suggest particular courses of action, operating as negotiating tools for daily interaction. Demonstrable emotional commitment can be advantageous to the individual concerned. For example, people known as trustworthy tend to profit in business transactions. Emotions can be seen as evolved capacities.

Frank has produced a polished argument and a clearly constructed book. His thesis, that moral action works, is optimistic and offers a

solid basis for altruistic action. It is an important caveat to relentlessly pessimistic views of human nature.

(*WW Norton & Co, London 1988*)

The Language Instinct

Steven Pinker

Pinker's book provides a crisp Darwinian theory of language. His thesis is that language is an adaptation, an evolved capacity engineered for functional purposes. This brings him into direct conflict with social scientific accounts that see humans as *tabulae rasae*, who are then etched with learned symbols and codes.

Pinker follows Noam Chomsky in describing language as an innate instinct. Unlike Chomsky, he does not draw back from the Darwinian implications of this view. For Pinker, learning, speaking and understanding language are not solely cultural functions.

The Language Instinct provides an excellent introduction to the leading ideas in contemporary linguistics. Although Pinker's conclusions will not be to everyone's liking, the book remains an influential contribution to an emerging discipline.

(*Penguin, London 1994*)

Darwin's Dangerous Idea: evolution and the meaning of life

Daniel C Dennett

Dennett places the Darwinian scientific and philosophical revolution alongside that initiated by Copernicus and Galileo. For Dennett, Darwin has unearthed a truth that relegates religious belief to 'cultural zoos and libraries'.

Darwin's dangerous idea is the very stuff of natural selection itself. For Dennett, the Darwinian model is an algorithm applicable to genetics, computer science, engineering and so on. It provides design without recourse to a grand designer, leaving our world of religious meaning suitably demolished.

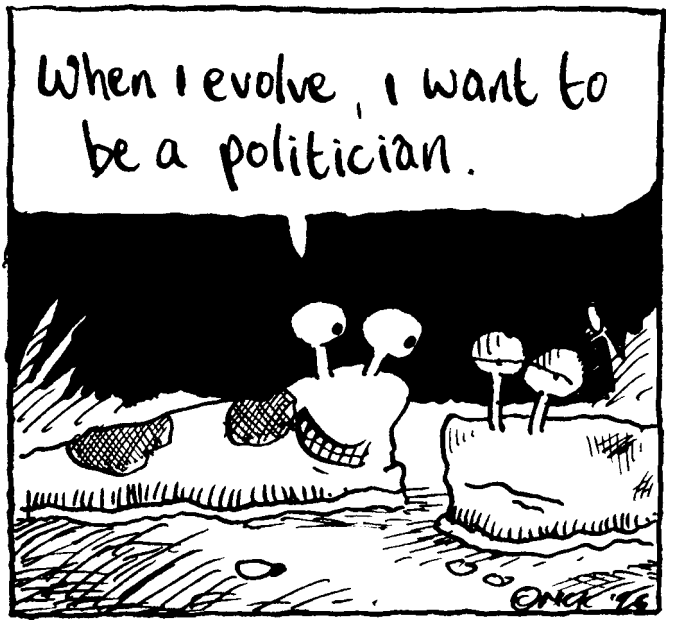
Dennett's book branches into a number of complex scholarly debates on 'genomes', 'he 'eukaryotic revolution', 'panspermia' etc. As an academic text it serves as a useful introduction. As a popular book, I can only recommend heading for the chapter summaries.

(*Penguin, London 1995*)

Evolution and Healing: the new science of Darwinian medicine

Randolph Nesse and George Williams

Evolution and Healing corrects the dearth of Darwinian texts on medicine and creates a new paradigm – Darwinian medicine. Nesse and Williams argue that imbalance between our bodies and the environment is one of the principal causes of contemporary diseases. 'Natural selection has not had the time to revise our bodies for coping with



fatty diets, automobiles, drugs, artificial lights and central heating'. We were not designed for the artifices of modern life.

As well as integrating Darwinian medicine into mainstream evolutionary psychology, Nesse and Williams provide a useful introduction to Darwinian theory. The book is clear, well written and packed with examples.

(*Pheonix, London 1995*)

Born to Rebel

Frank Sulloway

Born to Rebel claims that the driving force of history is the conflict between siblings. In fact, for Sulloway, 'the ultimate failure of the French Revolution resided in the participants' inability to grasp this fact'.

Sulloway argues that first born children are conformist, keen to protect their head start in inheriting parental territory and possessions. Younger children, on the other hand, tend to be rebellious, seeking to differentiate themselves and strike out on their own. Younger children are risk-seeking, elder siblings are risk-averse.

Born to Rebel offers novel insights into relationships and personalities. However, it does not allow enough scope for contingency. Martin Luther, Stalin, Mussolini and Carlos the Jackal were all first born children, yet none of them could be considered conformist. Although Sulloway offers some explanations for the exceptions (such as parent-child conflict) it would be dangerous to elevate his thesis from the interesting to the definitive.

(*Little Brown, Chicago 1996*)

George Lawson
Researcher at Demos

Facts

- In a study held on an American college campus, students were approached by an attractive stranger of the opposite sex who said, 'Hi, I've been noticing you around town lately and I find you very attractive'. Asked consecutively: 'would you go on a date with me tonight?, would you go back to my apartment with me tonight?, would you have sex with me tonight?'

  50% of women said yes to the first question, 6% to the second and 0% to the third.

  50% of men responded yes to the first question, 69% to the second and 75% to the third.[1]
- **Buss' study of thirtyseven cultures around the world found that women universally desire men with good financial prospects. They also tend to desire ambition and industriousness. Men, on the other hand, covet only two qualities more than women – relative youth and physical attractiveness.[2]**

- Students who major in economics are more than twice as likely to cheat than those who major in other subjects.[3]
- **Archaeological records suggest that trade was used to build alliances long before the modern era. Decorative goods from 60,000 years ago, and pierced shells from the**

Cro-Magnon period 30,000 years ago, both travelled up to 400 miles from their places of origin.[4]

- The mature queen in a hymenopteran nest (which could include ants, bees and wasps) makes one mating flight when young and stores up sperm for the rest of her life. She rations it out to her eggs as she sees fit over her remaining years.[5]
- **Common sense tells us that expressions (eg smiling) are usually the product of emotions (eg happiness). However, it is less well known that we can actually generate an emotion by making the right facial expression.[6]**

- There are signs that reveal when someone is lying, such as the tone and rhythm of a voice, the timing of facial movements, the symmetry of the movement and the presence/absence of certain muscular components.[7]
- **Animal foreplay: when a male octopus spots a female, his normally greyish body becomes striped. He swims above the female and begins caressing her with seven of his arms. If she allows this, he reaches towards her and slips his eighth arm into her breathing tube. A series of sperm packets move through a groove on his arm, finally slipping into the mantle cavity of the female.[8]**

- And: when the male African village weaverbird spots a female, he displays his nest by suspending himself upside down from the bottom and vigorously flapping his wings. If the male passes this test, the female enters the nest and examines it for up to 10 minutes while the male sings to her before she makes any commitment to cohabit.[9]
- **The homicide rate in thirteenth century England was similar to that of many American inner cities today.[10]**

- It's alright for some: 5% of male elephant seals do 85% of the mating.[11]
- **In an experiment carried out in New York City, more than 50% of 'lost wallets' were returned to their owners with cash intact.[12]**

- Both males and females believe that a woman is more likely than a man to return a lost wallet to its owner.[13]
- **Unhatched ants are sometimes carried off by warrior castes from rival nests and put to work as slaves – cleaning, foraging and caring for their new brood.[14]**

- Warfare in which large rival armies fight to the death is known only in man and in social insects such as ants, bees and termites.[15]
- **In Canada, more than twice as many divorced men aged 25–29 remarry as women of the same age cohort (88% compared to 40%). Likewise, men aged 20–24 are far more likely to remarry than women in the same group (83% compared to 61%).[16]**

- Chance has an immense impact on evolutionary development, dictating the creation and survival of genetic mutations. This has led Stephen Jay Gould to assert, 'if we could rewind the tape of biological history and start the process again, the outcome would be different. Not only might there not be humans, there might not be anything like mammals'.[17]
- **Animal altruism: a fox approaches a nest of birds. The parent bird limps away from the nest, holding out one wing as if it was broken. The predator, sensing easy prey, is lured away from the chicks in the nest. At the last moment, the bird leaps into the air to avoid the fox – or not.[18]**

- Woman detective constable in south London: 'Sexism in the police service is here to stay – you cannot legislate against human nature.'[19]
- **Genetic selection is an hierarchical process that can have unfortunate side effects. For example, the mutation that changed the haemoglobin molecule to provide resistance to malaria also generated sickle cell anaemia.[20]**

- Yanomamo, 'the fierce people', trade items as diverse as arrow points, cotton yarn, baskets, clay pots, fish hooks and steel tools. And, of course, dogs and hallucinogenic drugs.[21]
- **During the past few hundred years, the average length of life has steadily increased, but the maximum duration has not. This means that 50% of us now live to 80 years old. However, by the time we are 100, 99% of us will be dead. Statistically, noone is alive at 115.[22]**

- Natural selection at work: two men are running away from a tiger. One stops to put on a pair of running shoes. 'What are you doing that for?' the other asks. 'Even with running shoes on you can't outrun a tiger.' 'No,' he says, 'but I can outrun you.'[23]
- **Most small children killed by stepfathers are beaten to death. Genetic fathers are more likely to shoot or asphyxiate a child.[24]**

- In Detroit, genetically unrelated people who live in the same household experience a homicide rate more than 11 times greater than co-residing blood kin.[25]
- **There is a physical difference between the true smile of enjoyment and the other social, or false smiles we display. The enjoyment smile involves the action of the muscle which orbits the eye, not just the smiling lips.[26]**

- Our species has spent 99% of its existence as hunters of meat and gatherers of plants.[27]
- **During almost all of human evolution, it has been adaptive to conserve energy by being as lazy as circumstances permit. Energy used to be a vitally needed resource and could not be wasted. Today this take-it-easy adaptation may induce us to become couch potatoes, but at least we know that it served an honourable purpose once upon a time.[28]**

- As the head of the male preying mantice is home to some inhibitory nerve centres, the female eats it to improve his sexual performance. She then promptly devours the rest of him. This leaves us with an evolutionary paradox. Why hasn't the male preying mantice caught on to his vulnerability to cannibalism?[29]
- **There are 3 million types of insect adding up to a million, million, million individual insects. In comparison, there are not yet six million, million humans.[30]**

- In an experiment, almost three quarters of people behaved honestly in a game where they could have benefited without detection by cheating.[31]
- **A doubling in the number of student engineers would increase the GDP of the United States by 0.5%. A doubling of law students would lead to a decline of 0.3%.[32]**

- During the Reformation, two thirds of Catholic martyrs executed in Protestant countries were eldest children. Younger ranking children accounted for 96% of Protestant martyrs in Catholic countries.[33]
- **There are 6 basic human emotions: anger, fear, disgust, happiness, sadness and surprise. These are expressed on our faces using combinations of facial muscles particular**

to each one. If you feel angry, blood rushes to your hands. With fear, blood rushes to your legs. The responses are the same across a variety of cultures.[34]

- Symmetry is the outward sign of inner genetic fitness. Students with symmetrical faces have 2 to 3 times as many sexual partners as asymmetrical ones. More unexpected was the finding that symmetrical men make better lovers. While women with lopsided lovers have orgasms only 38% of the time, those with symmetrical partners enjoy them 75% of the time.[35]

Notes

1. Buss D, *The evolution of desire: strategies of human mating*, HarperCollins, London 1994.
2. Buss D (see 1).
3. Frank R, Gilovich T and Regan D, Does studying economics inhibit cooperation? in *Journal of economic perspectives* 1993; vol 7, pp 159–71.
4. Ridley M, *The origins of virtue*, Penguin, London 1996.
5. Dawkins R, *The selfish gene*, Oxford University Press, Oxford 1989.
6. Ekman P, 1996.
7. Ekman P, 1996.
8. Pinker S, *The language instinct*, Penguin, London 1994.
9. Pinker S (see 8).
10. Daly M and Wilson M, *Homicide*, Aldine de Gruyter, New York 1988.
11. Buss D (see 1).
12. Hornstein H, *Cruelty and kindness*, Prentice Hall, New Jersey 1996.
13. Frank R, unpublished survey.
14. Dawkins R (see 5).
15. Dawkins R (see 5).
16. Buss D (see 1).
17. Nesse R and Williams G, *Evolution and healing: the new science of Darwinian medicine*, Pheonix, London 1995.
18. Dawkins R (see 5).
19. *Guardian* 31.10.96.
20. Nesse R and Williams G (see 17).
21. Ridley M (see 4).
22. Pinker S (see 8).
23. Pinker S (see 8).
24. Daly M and Wilson M (see 10).
25. Daly M and Wilson M (see 10).
26. Ekman P, 1996.
27. Interview with David Buss, *Observer* 30.4.95.
28. Pinker S (see 8).
29. Dawkins R (see 5).
30. Dawkins R (see 5).
31. Frank R, Gilovich T and Regan D, The evolution of one-shot cooperation in *Ethology and sociobiology* 1993; vol 14, pp 247–56.
32. *Observer* 16.6.96.
33. Sulloway F, *Born to rebel*, Little Brown, London 1996.
34. Interview with Paul Ekman, *Times higher education supplement* 21.7.95.
35. *The Times* 10.11.95.

Signs of the times

PC	EP
Marx	Darwin
Freud	Darwin
God	Darwin
sociobiology	evolutionary psychology
class struggle	sibling rivalry
maternal love	foetal conflict
group selection	selfish gene
rational self-interest	strategic emotions
survival of the fittest	reproductive success
tabula rasa	Swiss army knife
The Ten Commandments	The Moral Animal
love at first sight	0.7 waist-hip ratio
greed is good	honesty pays
genetic constraints	genetic endowments
battle of the sexes	mating strategies
blood is thicker than water	kin selection
mutual aid	reciprocal altruism
original sin	sperm wars
culture-specific	universal
soul	human nature
gender	sex
social science	science
humans and animals	animals
narratives	testable hyphotheses
instincts	domain specific cognitive mechanisms

Demos news

Party conferences

Demos put in its first corporate appearance at the political party conferences with a double whammy of fringe meetings on *The disconnected generation* and *Winning women's votes*. Looking at both why young people feel ostracised by institutional politics and how particular leadership styles and the recent cross-party rhetoric of family values leaves women cold, we focused on exactly those people who weren't attending conference.

Working closely with the BT Forum, the Trust for the Study of Adolescence, the Fawcett Society, MORI and the Women's Communication Centre, as well as a host of MPs ranging from Alan Howarth (Labour) and Angela Rumbold (Conservative) to Chris Davies (Liberal Democrat), we talked to packed audiences and created space for a considered debate about the most pressing issues. Both *The Guardian* and *The Times* covered the meetings, and we're already planning what to tackle next year.

Launching the commentaries

At the Labour party conference, we launched the first in a new series of commentaries. Designed to be short, incisive interjections into wider topical debates, we kicked off with *Mistakeholding: whatever happened to Tony Blair's big idea?* Carrying a critique of the Will Hutton–John

Kay models of stakeholding, together with a proposal for what might work in their place, *Mistakeholding* was picked up by the *Financial Times*, the *Observer* and the *New Statesman*. (Further copies are available from Demos for £2.50.)

Moving on the debate

Since the conferences, there have been a number of debates rumbling through the news and comment pages of the broadsheets which Demos has successfully moved on. With the symptoms of election fever already setting in, issues surrounding women's votes have been of almost daily interest.

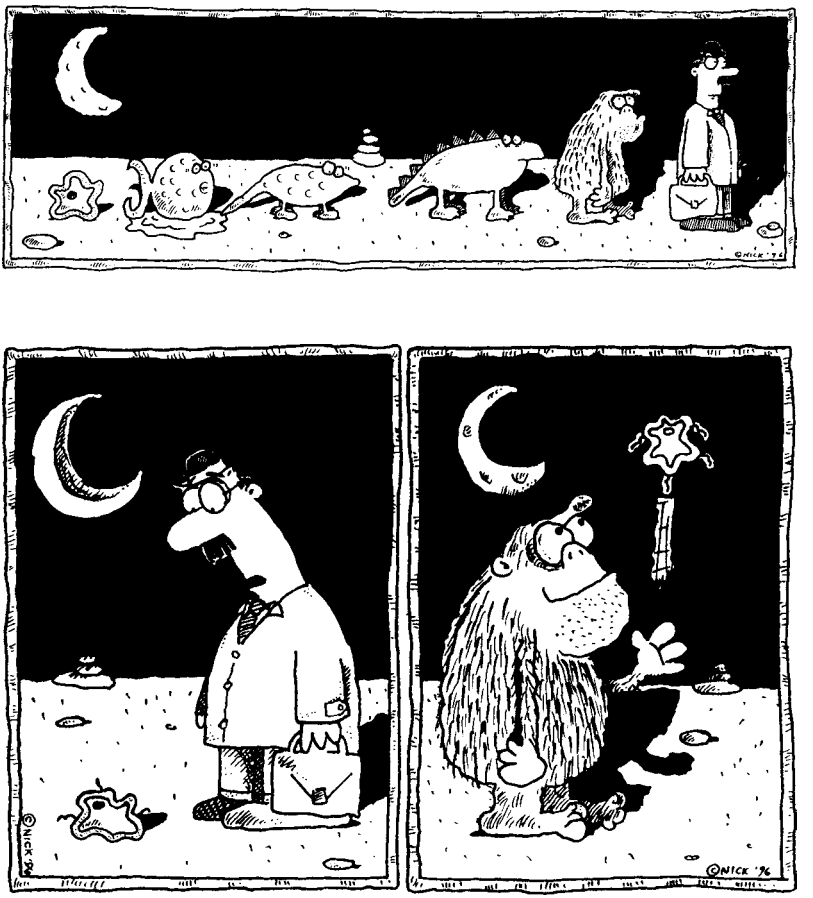
While much of the attention has focused on hairstyles and voting intentions, Helen Wilkinson has warned through a series of articles and letters in the press, as well as a feature on *A week in politics,* that what matters are policies which enable women to make real choices about how they balance their lives and leaders who do not send out conflicting messages.

Paddy Ashdown may be happy to launch his party's document on women with the claim that it is the most important paper of the Liberal Democrats' conference, only to leave women out of the leader's speech days later. And Tony Blair may continue to bask in his relative popularity among women while failing to connect with their frustrations by littering his vision of an age of achievement only with references to men and men's things. But as Helen has contended, women's traditional late voting means no leader can count on their support until the voting slips are posted.

Hand-wringing over ailing citizenship and morality has also become staple fare. But as Geoff Mulgan demonstrated with a piece in the *Guardian* which provoked much interest, most contemporary commentators have forgotten all that has been learned on teaching such subjects during the past few decades the world over. Drawing on Demos' ongoing project on active learning in the community, he pointed out that young people learn best about these subjects by getting involved in practical projects, preferably outside the classroom.

Internal developments

Since expanding over the summer, Demos has been taking stock of its own activities in a number of ways. Subscribers will already have been asked for their views on the *Quarterly*, our launches and events, the subscriptions package and so on. A working party has been set up on the *Quarterly*, chaired by Martin Jacques and including our marketing consultant Mark Perryman, to assess the future potential of the



publication and how it might be improved. We will be taking your views into account and will report back before long.

Serious futures

The future has been concerning us on the research side too. Having launched the most comprehensive application of our Serious Futures approach in *Open wide: futures for dentistry in 2010* by Perri 6 in late October, we are now using it to look at the future of Britain, user involvement in health care, the information society and of women's lives at large.

Our findings on the latter will be launched at a major event which concides with International Women's Day (March 7–8, 1997) at Olympia 2. Called *Women Mean Business*, it will feature a Demos designed seminar programme which will reflect the themes and issues rising out of our research, together with a comprehensive exhibition with broad appeal to every working woman.

Retrospective

While looking to the future, we have not neglected our past. January sees the launch of a Harper Collins book which brings together the best of Demos' work from our first four years. Featuring chapters from authors such as John Gray, Roger Scruton, Philip Dodd, David Hargreaves and many others, *Life after politics* will be accompanied by a major conference on Saturday February 1 1997 at the Institute of Education. For more information, please contact Debbie Porter, Marketing and Events Manager, on 0171 353 4479.

Demos staff

The autumn has seen some new additions to the staff in the office, and consequently some revision of responsibilities. Lindsay Nash is our new Publications Manager and will be taking on production and proofreading of all publications including the *Quarterly*. Looking after subscribers now lies with Alison Beeney, our Publications and Marketing Assistant. George Lawson has joined us as a full-time intern and made a noteable contribution to a short-term project on the future of London, as well as assisting on this issue of the *Quarterly*. And Jamie Coulthard has overhauled our IT strategy and brought a slickness to our presentations which makes them truly worthy of conferences on a grand scale. Alex Mayor is making light work of an abundance of administration, while Sarah Gregory and Helen Hayes are lending valuable support on a part-time basis to our Family Values and Futures For Women projects.

Other staff reachable through the Demos office include: Geoff Mulgan, Director; Richard Warner, General Manager; Perri 6, Research Director; Adrian Fletcher, Tom Ling and Helen Wilkinson, Project Directors; Rowena Young, Communications Manager; Debbie Porter, Marketing and Events Manager; Tom Bentley, Researcher and Executive Assistant; Ben Jupp, Mark Leonard and Jamie Sainsbury, Researchers; Gordon Willis, Book-keeper; Manica Power, Design Assistant; and Annie Creasey, Office Assistant.

Demos Associates also contactable through the office: David Cannon, Liz Greenhalgh, Charles Landry, Charles Leadbeater, Robin Murray, Professor Ray Pahl, Rod Paley, Professor Sue Richards, Jonathan Scales and Ken Worpole.