Krellenstein, M. (April, 2001). What have we learned from evolutionary psychology?

Marc Krellenstein
Northern Light Technology Cambridge, MA
Emmanuel College Boston, MA
krellenstein@acm.org

ABSTRACT

Evolutionary psychology claims biological inclinations for certain behaviors (e.g., a desire for more frequent sex and more sexual partners by males as compared to females), and the origin of these inclinations in natural selection. Jerry Fodor's recent book, The Mind Doesn't Work that Way (2000), grants the nativist case for such biological grounding but disputes the presumed certainty of its origin in natural selection. Nevertheless, there is today a consensus that at least some of the claims of evolutionary psychology are true, and their broad appeal suggests that many see them as easy insights into and possible license for some controversial behaviors. Evolutionary psychologists, on the other hand, caution that an origin in natural selection implies only an inclination for certain behaviors, and not that the behaviors will be true of all people, will lead to happiness or are morally correct. But such cautions can be as facile as the simplistic positions they are intended to counter. A biological basis implies tendencies to behaviors that will be pleasurable when engaged in, and that can be modified to an extent and at a psychic cost that is, at best, not fully understood. Also, while it is true that naturally selected behaviors are not necessarily moral, the implications of current evolutionary psychology cast doubt on any absolute foundation for morality at all, as well as suggesting limits on our ability to fully understand both ourselves and the universe around us. However, this does not mean that our (relative) values or apparent free will are any less real or important for us.

WHAT HAVE WE LEARNED FROM EVOLUTIONARY PSYCHOLOGY?

Evolutionary psychology posits that evolution is responsible not only for human physiology and anatomy but also for certain human behavioral characteristics. These characteristics, no less than physical characteristics, are found to offer a reproductive advantage, resulting in evolutionary selection of them through selection of the underlying biological (e.g., genetic, hormonal) basis of those characteristics. One of the most popular and widely accepted claims of this sort is the evolutionary explanation for the presumed biologically based fact that men tend to want more sex than women - more frequent sex, more sexual partners and more casual sex. The claimed reproductive advantage for this behavior is that a man wanting sex most of the time and with different people could father a very large number of children as compared to one who didn't, while such an inclination in women would not produce a comparable advantage, since women can have at most one child every nine months. Similarly, a biologically based attraction by men to younger women would result in more fertile partners and more offspring (an attraction to post-menopausal women would, at the extreme, be a genetic dead end), while an attraction to younger men by women would not make much of a difference in pregnancy or survival rates and hence not be selected for. These biological inclinations do not imply that women might not also want sex frequently, desire multiple partners or be

attracted by youth, or that any particular woman might not be more so inclined than any given man, given the range of factors that contribute to such complex behaviors. Rather, the claim is only that a presumed reproductive advantage results in a greater biological inclination for these behaviors among men, suggesting, as seems to be the case, that they are likely to be more pronounced among men in general.

One of the most notable recent books elaborating on the ideas of evolutionary psychology is Steven Pinker's How the Mind Works (1997), to which Jerry Fodor has now offered a characteristically cheeky challenge in The Mind Doesn't Work That Way (2000). Fodor reminds us that there are two separate claims in such explanations: a biological basis for certain behaviors - for nature ('nativism' is Fodor's preferred term) as opposed to nurture - and for the origin of this biological grounding in evolutionary (reproductive) benefits. On the first claim, Fodor has, with one-time colleague Noam Chomsky, long been on the nativist side, and Fodor commends Pinker for his review of the primary evidence here, observing that it is still the minority viewpoint compared to the empiricist 'blank slate' view of human nature. The key evidence for the evolutionary position comes both from animal studies (and the presumed continuity between animal and human evolution) and various kinds of cultural data. For sexual differences between the genders that cultural data includes cultures with males having multiple wives without much in the way of the reverse; the long-standing presence of pornography aimed at men, but not women; and the extent of promiscuity in male, but not female homosexual relationships, suggesting that the natural expression of male sexuality when not compromised by female sexuality is for more promiscuous behavior (this last is a nice example of the creative but sometimes tenuous hypothesizing of researchers in this area).

Pinker also summarizes evidence for the claimed evolutionary explanation for the biological grounding of these behaviors, but Fodor is much more critical of this claim. Some of this evidence is little more than speculation on how a given behavior would enhance survival, though other instances - such as the relationship among mammals between the size of male genitals and the degree of promiscuity of the female (more promiscuity is linked to larger genitals = more sperm = more assurance of paternity) - are closer to the predictive explanations expected of accepted scientific theories. Overall, though, the data supporting an evolutionary explanation is more ambiguous and open to other interpretations than the data supporting biological grounding itself. As has been frequently observed, explanation by appealing to natural selection is almost too easy - it is fairly simple to create a story about almost any behavior having at least some reproductive benefit in some circumstance. We can easily theorize reproductive advantages of aggression, but also for cooperation; for more promiscuity among males but also for the tendency of males to form pairs and care for dependent human children (who need a relatively long time compared to most animals before they can fend for themselves). Of course, all of these may be true -- natural selection isn't especially neat, and contrary behaviors may exist because of what they contribute at one time or another in one's life, or the way they interact, or as distinct but separately successful reproductive strategies - but it makes it more difficult to figure out what is and isn't the result of natural selection.

What could produce such biologically grounded behaviors if evolution is not the explanation? The alternative explanation is that such behaviors are the incidental byproduct of other aspects of human development which may themselves have had (or, for that matter, also did not directly have) an evolutionary explanation. This is a view closely associated with Stephen Jay Gould (see Gould, 1997, for example) and it is Fodor's view as well. Fodor spends the last

chapter of his book attacking various methodological ideas implicit in Pinker's and others' work that suggest than an evolutionary or any other historical explanation of a behavior's origin is necessary for psychological understanding, observing, for example, that we figured out the function of the ear and the hand long before we had an understanding of evolution.

True enough. However, Fodor spends more time arguing that an evolutionary explanation is not the only possible one than he does arguing that it is in fact the wrong one, and what time he does spend on that is mostly directed not at the explanations for sexual differences and similar behaviors at the heart of evolutionary psychology but at the idea that naturally selected adaptations are the basis for the cognitive architecture of the mind. Fodor's argument on this point is tied up to his general argument - which forms the bulk of this book -- that Pinker is wrong in stating we understand the mind's cognitive architecture, and that it is essentially computational, a model Fodor praises but finds inadequate for anything like a complete explanation of human reasoning. Fodor is almost certainly right about this; on these points, Pinker's book is best read as the sort of 'glass if half full' testimonial new explanatory constructs sometimes stimulate even when the glass is still mostly empty.

But it is the evolutionary explanations for sexual differences and some other behaviors more directly tied to our emotions (and biology) that have been so compelling. What Fodor has to say here is more directly stated in his initial review of the How the Mind Works in the London Review of Books (1998), and it seems to consist mostly of a complaint that we just don't need the evolutionary explanation to understand why men want beautiful women or parents love their children. Fodor thinks those behaviors can be (obviously are, to his mind) just for their own sake, and don't need any further explanation as adaptations; that, while the brain as a whole evolved under natural selection, these and other particular behaviors, though admittedly innate, need not have arisen because of the claimed evolutionary benefit. He observes that there could be other unknown explanations that fit the data, and that we know too little about the specific evolution of the brain to make as conclusive a connection between, for example, evolutionary changes in the brain and the desire for beautiful (and hence more likely fertile) women as we can make between the gradual increase in the length of the giraffe's neck and the benefit it provides in picking fruit from the tops of trees.

Fodor is of course correct about the possibility of alternative explanations and the relative weakness of this data compared to that supporting anatomical evolution. It's certainly the case that some reasoning in evolutionary psychology consists of little more than the assertion that a behavior must both be innate and a result of natural selection because an all too easily constructed story can be offered for some reproductive benefit. But Fodor grants that some of these evolutionary explanations are very compelling, and he offers no specific alternatives other than the conviction that the behaviors in question probably exist for their own sake and not in the interest of reproductive success. It's hard not to read him as seizing on the weakness of some evolutionary explanations and assumptions to exaggerate an across-the-board likelihood of possible but unknown alternatives, and to then conclude with an emotional rejection of psychological Darwinism as "preposterous."

The reality is that there is a growing consensus that the evolutionary explanation is probably right for explaining certain key gender differences in sexuality and some other behaviors (e.g., love of one's children) with a very likely biological component. Pinker and others have posed evolutionary explanations for a great many other behaviors and problems -- Fodor's review ridicules the idea that a chapter in Pinker's book is actually entitled "The Meaning of Life" (more on that later) -- and certainly the case has yet to be

made for most of these (for a discussion of some of Pinker's excesses see the review of How the Mind Works by Jones, 1997). But where there is at least a likely case for a biological basis, these evolutionary explanations have brought renewed attention to the 'nature' part of the nature-nurture question and offer a likely rationale. Such explanations are sometimes compelling enough to themselves provide some additional support for this biological basis, since having a good explanation makes it more appealing to interpret sometimes ambiguous data in a way that fits that explanation (though, following Fodor, it should be remembered that a plausible evolutionary story is not sufficient for proving the existence of a biological disposition when it is the only 'evidence' for that disposition).

Coupled with the seemingly deep-rooted nature of the survival advantage implied by evolutionary explanation, this biological basis is often seen as implying it is as futile to ignore these biological urges as it is to ignore hunger and thirst; that satisfying these behaviors is tied to our happiness; and that, because such behaviors are both natural and designed for our survival, they are to some degree justifiable, and perhaps even desirable. When the behaviors in question include adultery or jettisoning an older wife for a younger one, it's not hard to wonder at the appeal of these explanations for some and the furor they provoke in others. Most popular exponents of evolutionary psychology, including Pinker and particularly Robert Wright before him (1994), are quick to deny such provocative implications. They and others have observed that a biological basis (of whatever origin) does not imply that everyone will have that behavior, or that it will necessarily make someone happy, or that it is moral. Genes are shaped by evolution for survival into the next generation, and not for the long-term happiness of their host or the rightness of the behavior. A genetic grounding for intense male promiscuity might be good for the genes but bad for the person.

But such rejoinders smack of a too quick political correctness, and it's as easy to make too little of the data as it is too much. More research will be needed to clarify just what biological and evolutionary explanations can tell us about understanding and modifying human behavior. Meanwhile, here's a minimal likely set of ideas that we can start to use on the probable assumption that future research will confirm them:

1. A biological basis implies behavior that is at least partly unwilled. This means that, while these behaviors are not automatically caused by such inclinations, they are also not entirely a matter of an individual's simple conscious choice (perhaps even the choice of a male to commit adultery), level of maturity (often cited as a reason for a male's lack of interest in long-term commitment) or susceptibility to cultural influences such as advertising (sometimes cited to explain a male's interest in nubile young women). One's ability to resist or modify such inclinations, while clearly possible, is variable, and probably not without costs. In the case of behaviors due mostly or entirely to cultural factors or individual choice, the difficulty of resisting or changing the behavior is at least unknown; while deep-rooted habits or cultural changes can be presumed to have some of the same 'hard-wired' physiological accompaniments that may make them resistant to change, other such behaviors may not. A biologically based behavior, on the other hand, can be assumed to have physiological (e.g., hormonal) underpinnings that can't be trivially dispensed with. Celibacy, for example, may exist, but we have the lingering suspicion that fairly unusual and dramatic environmental forces must be at work to overcome the biologically based opposite inclinations, and such inclinations might continue even if they are successfully ignored. In truth, we really don't understand just how malleable different biologically based

behaviors are, or at what cost. Our ignorance on this point is probably the single most significant constraint on our ability to draw more extensive implications from the biological basis for these behaviors.
2. A biological basis for a behavior indicates that engaging in the behavior will produce at least short-term pleasure, and abstaining from it or resisting it will probably cause some amount of discomfort. Indeed, we regard the inability to enjoy biologically based pleasures such as sex and food as a possible sign of pathology in a way that we don't accord more culturally determined pleasures. While it's true that there's no guarantee that such a behavior will be good for our long-term happiness, it is at least an open question to what degree a given individual may weigh such short-term pleasures in trying to live one's particular life.
3. The great likelihood of innate biological differences in sexual behavior between men and women undercuts any utopian fantasy of a perfect mating of men and women. Rather, differences and some amount of resulting conflict would seem to be built-in. (An equally powerful idea from evolutionary theory is that there is some inherent conflict between the interests of any one child and those of the parents, with the former looking to exploit whatever parental resources it can for its own survival vs. the direct interest of the parents or the parents' other progeny.)

Pop culture captures the idea perfectly in the recent low-brow comedy There's Something about Mary (1998), in which Ted is advised by his friend, the slightly deranged Woogy, to masturbate just before going out on a date with the coveted Mary (actually, Woogy is shocked to find that Paul has not already availed himself of this piece of obvious conventional dating wisdom). Woogy's explanation is that this will not only make Ted less nervous but also make him more honest and more appealing to women since, for at least a little while, he will be "thinking like a girl." It's over-simplified (to say the least) and ignores the possibility of Mary having an active sexual interest herself. But it gets the evolutionary proposition basically right and draws attention to the impact of male sexuality, its transforming diminution in the period following gratification and the interesting prospect of what relations between the sexes would be like if that period existed forever.

4. Saying that a behavior has a biological basis indeed says nothing about whether the behavior is moral or immoral. Both evolutionary psychologists and ethicists alike agree that moral obligation exists in a separate realm, apart from what might happen to be the case of biology. Evolution is blind to any real purpose or design; what persists from an evolutionary viewpoint is simply that which has a reproductive advantage (and the side effects of such factors). However, the very existence of moral behavior seems to be one more piece of partly hardwired behavior that has arisen in humans because of its net survival advantage (for a discussion of the evolutionary origins of morality see Wright 1994, Pinker, 1997, or Katz, 2000). In this view there is no objective truth of religion or rationality that compels us to behavior morally. The abstract feeling of 'ought', of having to do the 'right' thing is just one more intuition, as is our indignation over the wrong-doings of others, or the sense (suitably molded by the environment) of what is the 'right' behavior in a specific situation, whether it is keeping a promise or helping someone in need. Each competing but ultimately inadequate theory of morality might be seen as primarily based on one 'moral' intuition shaped by evolution and with its own reproductive advantage and sphere of application, but also possibly in conflict with another in certain situations, as the messy details of natural selection often are. Thus, evolution may have formed the utilitarian impulse to act so as to produce the greatest total happiness, but it also likely produced the sometimes conflicting Kantian sense of justice, of doing right for right's sake

and not because of the results. Neither pure utilitarianism nor a pure Kantian ethics will produce the greatest net reproductive benefits, and there isn't any particular set of axioms to reason the conflict between them.

Belief in a completely rational and well-founded moral code is also weakened by an evolutionary-based analysis of the concept of free will that is central to our practical conception of morality. Like morality itself, it is real enough - the idea that we choose what to do and could have chosen otherwise is a regular part of our daily experience. But an abundant philosophical literature on the subject makes clear that it is hard to reconcile the apparent reality of free will with the well founded materialist view that our actions are all physically caused and ultimately derived from biological and environmental antecedents, all of which end up physically encoded in our bodies and brains. Viewed from the evolutionary perspective, 'free will' is in some sense an illusion, and may be another evolutionary adaptation that has proven valuable -- useful for running our lives or assigning autonomous responsibility to individuals when that is a useful approach, e.g., to deter other behaviors [1].

Just as reductionist explanations of free will or other phenomena don't eliminate their psychological reality, the lack of an absolute basis for morality does not mean that the choices that are the subject of moral discourse are unimportant. Todd Andrews, the eccentric central character of John Barth's The Floating Opera (1988), described by Barth as a "nihilist comedy"(p. vii), concludes his hyper-rational inquiries into living with the insight that the lack of absolutes gives him as little reason to commit suicide as not. Todd realizes (with sincere surprise) that "in the real absence of absolutes, values less than absolute mightn't be regarded as in no way inferior and even be lived by" (pp. 251-252) [2]. In other words, our values persist, even though lack of an absolute basis for them tempers our moral judgments with the knowledge that they are at root arbitrary and the result of our genetic and environmental history. We may choose, for example, to accept some adulterous relationships, or to forego them because we reject violating an explicit commitment or because we value the intimacy of a relationship that deception or possible exposure might threaten. Any of these positions may turn out to be most consonant with our other values and choices, and for any them we must acknowledge a somewhat arbitrary quality to our choice and the possibility that others might choose differently. We do this, though, without giving up the importance of the particular choice for us. We can also maintain our belief that some particular others might be best served by the same choice, or perhaps just our own interest in being surrounded by such people, and hence the importance of persuading them to think similarly.

This is consistent with the post-modern view that denotes no special status to moral principles, though it is more of a multi-moralism -- with multiple equally valid (in the evolutionary sense) moral impulses and intuitions binding all people to varying degrees - than a moral relativism that allows for any arbitrary moral intuition. Once again, a piece of pop culture captures the current evolutionary position. The TV show Seinfeld is the exaggerated, comical embodiment of both the underlying nihilism of this position and the possibility of relative value - self-absorbed, mostly amoral characters who openly wonder what anything is about besides the next sexual relationship, but who also demonstrate the existence of relative values such as friendship, the correct way to break up with someone (phone call or in person, depending on the length of the relationship) and the choice of simple pleasures such as cereal for breakfast or watching baseball on TV.

5. While evolutionary psychology may help resolve certain philosophical problems such as free will and the basis of morality, it doesn't provide any answer to fundamental questions about the meaning of life, and Pinker does not

claim it does, his chapter title on the subject notwithstanding. However, Pinker is correct in observing that evolutionary psychology suggests that some of these fundamental questions may not be answerable at all. The key insight here is that any life form is at any given time at some arbitrary stage of evolutionary development. Fodor stated it well, several years ago: We would not expect spiders to be able to understand the "true science," and it's therefore reasonable to assume there are at least some limits on what our own minds can grasp, minds which, to the extent they are the product of natural selection, would have evolved for the mostly mundane tasks most important to our own survival (Fodor, 1983, p. 126).

At least two problems suggest themselves as unsolvable. The first, discussed by Pinker and others, is a problem familiar to readers of this journal: the 'mind' part of the mind-body problem, the "hard problem" of consciousness: just how it is that our physical brains produce the feelings and sensations of consciousness, our particular sensations of smell, color and so on (Chalmers, 1995). Wittgenstein said it best: "The feeling of an unbridgeable gulf between consciousness and brain process.... This idea of a difference in kind is accompanied by slight giddiness..." (1953, p. 124). To this reader, neither Wittgenstein's analysis of the difficulty - linguistic confusion - nor the many attempts since then have much headway, leaving Colin McGinn's tentative verdict of unsolvability based on evolutionary-based limitations as the most reasonable position (McGinn, 1989).

The second likely unsolvable problem is the big (biggest?) question of why anything exists - the problem of the origin of the universe, in the broadest sense. The problem is a familiar one, but so ill-suited to modern scientific inquiry that it is today mostly ignored by science, and Pinker and others working in this area have also ignored it [4]. Big Bang theory may explain the moment of the universe's creation, but not why the laws it depends on exist - not why there should be anything at all (a pre-Big Bang state, or the physical laws that let it come into being, if you prefer) [3]. New advances in cosmology tease with the prospect of gaining on this underlying problem but in fact leave it untouched, since whatever can possibly be offered by way of explanation immediately becomes part of what now must be explained. This is a difficulty that seems to derive from the very way our minds evolved to think about causation and explanation, which evolution has presumably made more suited to visible, mechanistic instances of cause and effect. Those insisting on an answer are (as with the hard problem of consciousness) forced into one of several unsatisfactory positions - ignoring the problem, declaring it already solved or meaningless (when most people can readily feel the irrational awe it inspires), or entrusting it to religion, which tries to answer it by substituting another equally unknowable mystery - God -- in its place.5

Naturally, there's been speculation that the widespread tendency towards religious belief is itself an evolutionary adaptation, e.g., perhaps those with the first religious inclinations may have been more likely to sacrifice themselves for the good of the group, and so help perpetuate the genes of the group which overlapped their own genes (Edward Wilson, for one, suggests this in Consilience: The Unity of Knowledge, 1998, p. 258, though evolutionary theories of "group selection" that rely on individual sacrifice are controversial). Even for those not religious, it seems that human nature may contain an inclination for some central value or passion that makes life as meaningful and worthwhile as it can be, and, as with religion, makes us more likely to carry on our own genetic heritage (or perhaps just makes us more sexually attractive, as suggested by the work of Miller, 1998). This passion might be morally correct behavior, artistic expression, the pursuit of scientific knowledge or the primacy of human relationships - or the expression of our individual will and

intellect on a world we consider fundamentally without any intelligible meaning or value.

Whatever our passion, it is, like our free will and chosen values, both real in our experience and, from a third person point of view, a somewhat arbitrary artifact of evolution and our particular environmental history. It may be the essence of understanding our evolutionary heritage that we live the paradox of embracing and experiencing as most important to us what we can understand to be without any absolute foundation or explanation (Wittgenstein concludes his deconstruction of metaphysics in the Tractatus (1961) by observing that ethics, aesthetics and pretty much everything of value is "transcendental" and outside our ability to say anything sensible about it). The lack of such foundation is, as Robert Wright has observed, similar to the existentialist's views of the world as fundamentally absurd. But where existentialism cannot lay claim to any value - yet nevertheless trumpets the primacy and intrinsic value of autonomous choice - evolutionary psychology helps explain the basis for all sorts of pleasures and (relative) values, as well as providing the realization that who we are and what we do may not be as freely chosen as we think.

NOTES

1. This is a form of the "compatibilist" position: accepting a certain determinism with regard to our behavior but also accepting a compatible reality and usefulness to the concept of free will. See Dennett (1984) for a fuller account, or Libet (1999) for recent discussions on the subject.

2. This 1988 version, the same as the 1967 revised edition, is the author's original text. As Barth explains in the preface to the 1988 version, the first publication of the work in 1956 contained a publisher-demanded change to make the ending less nihilistic (and more explicit about relative values), with the love of a child being the key reason Todd aborts his plan to commit suicide.

3. For an effort in trying to extend Fodor's and McGinn's thinking on the limits of understanding to the problem of the origin of the universe see Krellenstein (1995). Pinker also includes in his list of unsolvable problems several problems -- morality, free will, meaning, etc. - which, as partly explained above, seem more likely to be resolved by evolutionary thinking.

4. Stephen Hawking (1988) has posed the problem this way: "Even if there is only one unified theory, it is just a set of rules and equations. What is it that breathes fire into the equations and makes a universe for them to describe? The usual approach of science of constructing a mathematical model cannot answer the questions of why there should be a universe for the model to describe. Why does the universe go to all the bother of existing?" (p. 174).
5Commenting on those who, seeing the difficulty, declare the problem meaningless, Robert Nozick (1981) has asked "why do they cheerfully reject the question rather than despairingly observe that it demarcates a limit of what we can hope to understand?" (p. 115).

REFERENCES

Barth, J. (1988). The Floating Opera and The End of the Road . New York: Doubleday. (Original work published 1956)

Chalmers, D. (1995). Facing Up to the Problem of Consciousness. Journal of Consciousness Studies, 2(3), 200-219.

Dennett, D. (1984). Elbow Room. Cambridge, Massachusetts: MIT Press.

Farrelly, B. & Farrelly, P. (Directors). (1998). There's Something About Mary [Film]. 20th Century Fox.

Fodor, J. (1983), The Modularity of Mind. Cambridge, Massachusetts: MIT Press.

Fodor, J. (1998, January 15). The Trouble with Psychological Darwinism. London Review of Books, 20(2). http://www.lrb.co.uk/v20n02/fodo2002.html (visited 2001, 22 April)

Fodor, J. (2000). The Mind Doesn't Work That Way. Cambridge, Massachusetts: MIT Press.

Gould, S.J. (1997, June 12). Darwinian Fundamentalism. The New York Review of Books. http://www.nybooks.com/nyrev/WWWarchdisplay.cgi?19970612034F (visited 2001, 22 April)

Hawking, S. (1988). A Brief History of Time. New York: Bantam Books.

Jones, S. (1997, November 6). The Set Within the Skull. The New York Review of Books. http://www.nybooks.com/nyrev/WWWarchdisplay.cgi?19971106013R (visited 2001, 22 April)

Katz, L. (Editor). (2000). Evolutionary Origins of Morality [Special issue]. Journal of Consciousness Studies, 7(1-2).

Krellenstein, M. (1995). Unsolvable Problems, Visual Imagery and Explanatory Satisfaction. Journal of Mind and Behavior, 16, 235-253.

Libet, B., Freeman A. & Sutherland, K. (Editors). (1999). The Volitional Brain: Toward a Neuroscience of Free Will [Special issue]. Journal of Consciousness Studies, 8(8-9).

McGinn, C. (1989). Can We Solve the Mind-Body Problem? Mind, 391, 349-366.

Miller, G.F. (1998). How Mate Choice Shaped Human Nature: A Review of Sexual Selection and Human Evolution. In C. Crawford and D. Krebs (Editors), Handbook of Evolutionary Psychology, pp. 87-129. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Nozick, R. (1981). Philosophical Explanations. Cambridge, Massachusetts: Harvard University Press.

Pinker, S. (1997). How the Mind Works. New York: W. W. Norton & Company.

Wilson, E. (1998). Consilience: The Unity of Knowledge. New York: Alfred A. Knopf.

Wittgenstein, L. (1953). Philosophical Investigations [G.E.M. Anscombe, Trans.]. New York: Macmillan.

Wittgenstein, L. (1961). Tractatus Logico-Philosophicus D.F. Pears and B.F. McGuinness, Trans.]. New York: Routledge & Kegan Paul. (Original work published 1921)

Wright, R. (1994). The Moral Animal: The New Science of Evolutionary Psychology. New York: Random House.