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In Our Bones (Or Brains): Behavioral Biology

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Editors' Note: *Research on our innate responses to conflict and to different situations that arise in negotiation has been burgeoning. It's not just a matter of fight-or-flight, in fact we are programmed in a number of overlapping and sometimes competing ways. And, as Yarn and Jones summarize, the research now suggests that we may be primed to collaborate more than to compete.*

We negotiate to influence the other side's behavior, and to do this effectively, we need a good understanding of people. This understanding often involves some knowledge and appreciation of the personalities, traits, characteristics, and backgrounds of the specific individuals with whom you are negotiating. Obviously, people are different, and many of the authors in this section will discuss recognizing and dealing with such differences, be they cultural, [Kelly, xx; Goh, xx; Avruch, *Buyer—Seller*] gender-based, [Kolb & Putnam, *Gender*] or a consequence of unique developmental and experiential histories. [Deutsch, *Internal Conflict*; Jeglic & Jeglic, *Disordered People*] However, you cannot discuss differences without having some underlying assumptions about commonalities. A good negotiator also understands *how* people *in general* behave and how to use this knowledge to predict and influence behavior. Thus, our starting point for understanding the other side (and ourselves for that matter) should be our "sameness," those behavioral traits we share as human beings, the shared aspects of our human nature. In this chapter, we address the problem of human nature in negotiation by discussing possible contributions behavioral biology may make to the theory and practice of negotiation.[1] We conclude that behavioral biology helps us to predict and influence behavior in negotiation because it reveals more about *why* people behave the way they often do. We also take the opportunity to provide the reader with references to a small part of the vast and rapidly expanding literature in this area, heretofore mostly ignored by the field of conflict resolution.

Why Are Negotiators Seemingly Irrational?

The dominant paradigm of negotiation promoted in most current conflict resolution practice and theory assumes that the negotiators are *homo economicus*, and thus behave and decide in accordance with a model of rational expectations, that is, with fully defined preferences, complete knowledge of available alternatives, and full information shared with other parties. Yet, experienced negotiators and mediators know that this rationality is difficult and most often impossible to achieve. The significant differences between these theoretical expectations and what negotiators actually experience can be traced to the evolution of the human brain.

At its most fundamental level, human behavior is a biological phenomenon, because, ultimately, all theories about human behavior are theories about the brain—an organ operating on physical principles that receives stimuli, makes computations, and directs behavioral outputs. Far from being an all-purpose computer or "blank slate,"[2] the brain has been shaped over millions of years by evolutionary forces producing a *species-typical* brain[3] that produces species-typical behavioral outputs in response to various stimuli. When modern *homo sapiens* appeared, approximately 100,000 years ago, our brains were pretty much as they are now—adapted to meet the challenges of life in an ancestral environment that biologists refer to as the "environment of evolutionary adaptation" (the "EEA"). The EEA was both a physical and social environment the challenges of which might be boiled down to food choice (eating), predator avoidance (survival), and mate selection (reproduction). If it is common for humans to exhibit a given behavior today, then the predisposition to behave that way may have enhanced survival and reproduction over time in the EEA and as a result became "hard-wired" in our brains through natural selection.

While the 100,000 years that have passed since life in the ancestral environment may seem like a long time, in evolutionary terms this is merely a blink of the eye, offering little time for natural selection to evolve our brains further. The environment in which we live, however, has changed dramatically in this time period. In short, we have a Paleolithic mind in a post-modern age, and behavior that seems irrational in the present environment may be perfectly rational when considered in the context of the EEA.[4] This mismatch between our ancestral evolved brains and the present day environment may explain the various heuristics, biases, and emotions [Korobkin & Guthrie, *Heuristics*; Shapiro, *Emotions*] that seem to irrationally depart from the model of *homo economicus* decision-making.

What Underlies Competitive or Cooperative Negotiation Behavior?

Most if not all of these heuristics, biases, and emotions have a biological explanation rooted in the tensions between competitive and cooperative behaviors that are a consequence of our sociality. Overly competitive behaviors are often blamed for negotiation impasses, but from a biological perspective, competitive behavior is hardly surprising, as purely selfish behavior certainly would seem to enhance reproduction and the survivability of one's genes in a world of scarce resources. And yet, we also cooperate, and this too increases reproductive fitness.[5] In the EEA, social group formation was cooperative behavior that improved our ancestors' ability to warn of and fight off predators and to find mates. With social living, however, comes conflict and competition over resources. The adaptive way to deal with conflict with others of one's species and thereby maintain the benefits of social cohesion is essentially to negotiate, to form friendships, alliances, and coalitions, members of which would protect and share resources. Such cooperative, altruistic behavior among kin makes biological sense and is common among animals—the closer the kin, the more shared genes.[6] Altruistic behavior towards non-kin is also common among social animals and has been explained by the notion of direct reciprocity—by helping B today, A expects B to reciprocate tomorrow.[7]

As a social behavior, negotiation involves some degree of cooperation to achieve a mutually-accepted agreement. But there is a critical tension between cooperative, altruistic behavior and competitive behavior—how does A trust B to behave fairly? While it is our nature to cooperate,[8] it is also our nature to "cheat" and take advantage of other's tendencies to cooperate, because the competitive selfish gene[9] tempts B to defect and merely free ride, to gain the benefits of cooperation without the costs.[10] Negotiation engages our unconscious evolved behavioral drives to be both competitive and cooperative.

Some Biological Preferences in Negotiation Behavior

The inherent tension between our behavioral tendencies to compete or cooperate presents the negotiator with some fundamental problems: how do you determine whom to trust, whether you've been treated fairly, and what to do when cheated? To some extent, we may be hard-wired to answer these questions, and in the following subsections, we present some of the emerging research on the sources of emotion surrounding trust, fairness, vengefulness, and forgiveness.

Trust

Should I trust the other side, and how do I get them to trust me? Intuitively, we understand that trust is at the foundation of virtually all social interaction and is crucial to economic, political, and social success.[11] [Lewicki, *Trust*] Of course, some degree of trust is essential for successful negotiations.

Considering its social importance, it is not surprising that scientists are beginning to uncover a biological basis for trust among humans that may be an evolutionary adaptation to promote the benefits of social exchange.[12] Some have found neuro-chemical determinants of trusting behavior, including the neuropeptide oxytocin, which can be stimulated by touch and other social interaction and seems to induce trusting behavior.[13] Others have employed functional magnetic resonance imaging (fMRI) to locate the neural correlates of trust, and have discovered that the "intention to trust" was mirrored by neural activation in the caudate nucleus, an area of the brain associated with reward processing.[14] Interestingly, this area of the brain is also activated when subjects receive money, consume cocaine, or view pictures of loved ones. Thus, trust may offer physiological rewards of its own, and humans may have an inherent "taste" or "preference" to trust or even to be trustworthy.

Although trust among family members and friends may be predictable based upon the experience of repeated cooperative encounters, this taste for trust may help explain why we trust unrelated strangers to the extent that we do.[15] This also makes people potentially vulnerable to being taken advantage of, so our brains have evolved an ability to interpret what others are thinking or intend based on their actions and communication, verbal and non-verbal. This "theory of mind" develops by approximately 4-5 years of age and is evidenced by the ability to attribute independent mental states to others, i.e., to understand that people may hold different perceptions or beliefs than you.[16] [Sally, *Theory of Mind*] This "mentalising" performed by the brain requires the stimulus of social signals, one source of which is the human face.[17] Researchers have found that many facial expressions are universal in meaning[18] and that even the most accomplished "poker face" is incapable of masking some "micro-expressions."[19] We also look for other social information, such as reputation. [Tinsley, et al., *Reputations*] One theory is that humans evolved the linguistic capabilities of the brain for the primary purpose of exchanging information with each other about who to trust.[20] When people talk about you, it gives others clues as to whether or not you are trustworthy.

A Sense of Fairness

In negotiation, a seemingly rational solution is often rejected by the other side as unfair. This has been found in an experimental setting using the simple ultimatum game in which two players are given the opportunity to win a sum of money. [Sally & Jones, *Game Theory*] The proposer suggests how the sum should be split between the two. The responder either accepts or rejects the offer. If accepted, the money is divided accordingly. If rejected, the players receive nothing.[21] Game theory predicts the rational outcome: the proposer will offer the smallest possible share and the responder, believing that something is better than nothing, will accept any positive share.[22] However, in a large number of human experiments, this is not what happens. Most proposers offer a 40 to 50% share and half of the responders reject offers less than 30%.[23] The most frequent outcome is an even split. Most people, it turns out, are strongly motivated by concerns for fairness and reciprocity, even when it is costly.[24] Similar behavior has been observed in nonhuman primates.[25] How might such fairness norms, [Welsh, *Fairness*] often contrary to strict self-interest, have evolved?

Game theoretic models and computer simulations of bargaining tasks have demonstrated that fairness can evolve in ultimatum game contexts where the players can obtain information about deals that have been made in the past—in other words, where players have reputations.[26] Other experimental research shows that when these fairness norms are implemented, intentions matter.[27] Unfair outcomes, when unintended, are not judged as harshly.

The proximate mechanisms of these fairness norms have recently been explored by a team of scientists using functional magnetic resonance imaging (fMRI) to scan the brains of players engaged in an ultimatum game as they responded to fair and unfair offers proffered by both human proposers and computers.[28] The bilateral anterior insula, a brain region often associated with negative emotional states like anger and disgust, showed higher activation for unfair offers, and in fact, the level of activation was correlated with the proportion of rejected offers. On the other hand, the dorsolateral prefrontal cortex, a region linked to cognitive processes such as goal maintenance, also showed higher activation for unfair offers, but was instead correlated with those offers that were ultimately accepted. The subjects seemed to be conflicted between the standard economic solution of accepting any positive amount and the more emotional response associated with unfairness—and this conflict was confirmed by activation in the anterior cingulated cortex, a brain region implicated in the detection of cognitive conflict. By the way, these activations were not as high when the unfair offers came from computer partners. After all, computers can't have intentions. But humans do, and from an evolutionary point of view, this sense of fairness helps one judge the intentions of others, thereby determining who to trust. In addition, it serves as a heuristic to help individuals from being taken advantage of.[29] [Welsh, *Fairness;* Wade-Benzoni, *Future*]

A Taste for Revenge

People do take advantage of others, and at the heart of most disputing is the perception by one or both parties that the other has benefited to their detriment. This sense of being aggrieved poses a huge barrier to negotiating agreement; it is not uncommon to find disputants engaged in litigation even when the costs exceed the rational value of settlement. Such vengeful behavior may be rewarded by the brain. Scientists have scanned subjects' brains using Positron Emission Tomography (PET) while the subjects made the decision whether to punish a person who had abused trust by violating a fairness norm.[30] The study showed that, as with decisions to trust, the caudate nucleus, a reward center, was activated while making the punish decision. These results reflect an expected satisfaction from punishing unfairness that may be an evolutionary adaptation that helped maintain group solidarity and cooperation while allowing the individual to assert a social reputation.[31]

This neurochemistry has evolutionary roots. The kin altruism[32] and reciprocal altruism[33] discussed earlier are not enough to explain the successful operation of reciprocity norms when dealing with strangers; however, if humans generally were known to be willing to punish unfair and non-cooperative behavior even though the punishment is costly and yields no material gain, it would encourage cooperation and discourage subsequent cheating and non-reciprocal behavior. While this may immediately bring to mind the classic "tit-for-tat" strategy,[34] altruistic punishment, also known as strong reciprocity[35] or "moralistic aggression" in animal behavior where it is regularly observed, is truly altruistic, producing public good at significant expense to those who punish. For example, chimps will not tolerate food sharing with, or groom, other chimps that don't share food or help groom.[36] In its extreme, social animals may ostracize repeat offenders, which in the EEA would have likely resulted in death. This selfless policing of social norms is a public good that contributes to social cohesion. It is robust in various behavioral experimental conditions,[37] and strongly reciprocal behaviors are regularly described in human experience.[38] Thus, even in the face of a rational solution, it is not surprising when negotiators get angry, show increasing resistance, or force an impasse if they still hold a grudge from some previous encounter or perceive that the other side is behaving badly or unfairly in the current negotiations.

The Need to Forgive and Apologize

A negotiated solution is hardly possible in the face of on-going vengeful, punishing behavior, but if individuals are interdependent, they will need to resume cooperative interaction at some point. Other social primates engage in conciliatory and consolation behaviors to restore important relationships after fights and other aggression.[39] These may be the evolutionary antecedents of the human behaviors associated with seeking and granting forgiveness. [Waldman & Luskin, *Anger & Forgiveness*] The evolution of such behaviors makes sense. For the person feeling aggrieved, on-going negative reciprocity can prove too costly. In dynamic environments where responses to social norms are in flux, decisions to punish may not only be costly in and of themselves, but may carry steep opportunity costs associated with failing to cooperate with a previous defector who has newly decided to cooperate.[40] Indeed, the human need to forgive is a significant emotion for which scientists are beginning to trace the neural correlates.[41] In turn, targets of moralistic aggression find it advantageous to engage in behavior that hastens forgiveness. A recent body of theoretical scholarship[42] suggests that apologetic behavior evolved for this purpose. Indeed, computational studies recently performed at the Primate Research Institute at Kyoto University in Japan suggest that apology can play a role similar to altruistic punishment as a means of maintaining cooperation, as long as the apology, which signals a willingness to conform to social norms in the future, is sufficiently costly.[43] [Brown & Robbennolt, *Apology*]

Some Cursory Conclusions

So what is a negotiator who can't tell a PET scan from an fMRI image to make of all of this? Our brains and, as a direct consequence, the nature of conflict and cooperation, have been shaped by millions of years of evolution that have encoded specific behaviors in the function of our neuroanatomy. Regions of the negotiator's brain struggle between competing and cooperating, and consequently natural proclivities surrounding trust, fairness, vengefulness, and forgiveness can both impede and facilitate negotiations.

Thanks to our shared anatomy, we are pre-programmed, even addicted in a very real sense, to trust others. A negotiator's natural inclination, particularly when lacking negative experience and social information, will be to trust, and perhaps to be more trustworthy. This inclination can be strengthened by simple preparations that promote production of the appropriate neuropeptides: comfortable surroundings, friendliness, the willingness to extend a hand (touch), and the sharing of food. And over the course of repeated interactions, you can reinforce this inclination further by establishing a reputation for trustworthiness and fairness. The same reputation is likely to become social information that will be exchanged and thereby enhance your ability to influence trusting behavior in negotiations with strangers in the future. Trust, however, is a two-edged sword, and awareness of our tendencies to trust may help us to avoid exploitation.

This offers some prescriptions for successful negotiations. We should give our partners every reason to respond to their natural inclination towards fairness, with appeal to objective standards and with assurances, where possible, that unavoidable negative outcomes were not a product of our intent. And perchance, where we might be perceived as acting unfairly, we should not be surprised if our partner reciprocates with behavior that may be irrational, even extremely costly. Our understanding of this tendency in ourselves as well as in others can help us avoid irrational escalation.

Where trust is breached, we must be aware that the same brain region that gives us a warm glow while viewing pictures of our loved ones also drives us to punish unfairness even when the act of punishment will cost more than we could ever hope to gain. Understanding the power of strong reciprocity can help us to manage the urge within ourselves as well as to be prepared for the reaction in others. If the other side feels we have acted unfairly and breached their trust, we should appeal to their desire to forgive by offering an apology. Often we must be given a reason to forgive, and one effective way to do so is to provide a costly signal that unfair behavior will not be repeated in the future.

The central message is not a particularly astounding one: successful social interaction generally, and negotiation more specifically, requires a finely tuned understanding of other people's intentions and actions. Behavioral biology teaches us that we have evolved brains that are usually pretty accurate in unconsciously making such calculations. Nevertheless, a more conscious understanding of the biology underlying negotiating behaviors may help us anticipate some behaviors and develop strategies to influence cooperative negotiating behaviors. Above all, we should not lose sight of the fact that the neuroanatomy that accounts for adaptive behaviors and emotions involving competition and cooperation has been selected over millions of years with survival of the species as the only objective. Far from being pathological deviations from the traditional model of rational decision-making, these are shared characteristics that account for who we are and define our nature as human beings. As behavioral negotiation theory has begun to mature, *homo economicus* has begun to evolve into *homo sapiens*. That is, human behavior has become more central to negotiation theory.[44] Negotiators should introduce themselves to *homo sapiens* and get to know him well.

Endnotes

[1] For the behavioral biology experts among our readers, we hasten to acknowledge that our treatment of the studies we have chosen to review is far from complete. So much so, that some may argue that our sins of omission have rendered some material inexact. While this is certainly a fair criticism, given length considerations, our choice was to carve out elements of the biology that best illuminated the practice of negotiation. For all of the details, we refer the reader to the generous notes included at the end of the chapter.
[2] STEVEN PINKER, THE BLANK SLATE: THE MODERN DENIAL OF HUMAN NATURE (2002).
[3] JEROME H. BARKOW, ET AL., THE ADAPTED MIND (1992).
[4] Owen Jones, *Time-Shifted Rationality and the Law of Law's Leverage: Behavioral Economics Meets Behavioral Biology,* 95 NORTHWESTERN UNIVERSITY LAW REVIEW 1141 (2001).
[5] In fact, competition and cooperation has been encoded in organisms without brains at all, purely a function of genetics. Social amoeba and other microbes engage in cooperative, altruistic behaviors to enhance survival in resource-poor environments. They also cheat and punish. *See, e.g.,* Michael Travisano & Gregory J. Velicer, *Strategies of Microbial Cheater Control*, 12 TRENDS IN MICROBIOLOGY 72 (2004); Gregory J. Velicer, *Social Strife in the Microbial World*, 11 TRENDS IN MICROBIOLOGY 330 (2003); Richard E. Lenski & Gregory J. Velicer, *Games Microbes Play*, 1 SELECTION 51 (2000); Gregory J. Velicer, et al., *Developmental Cheating in the Social Bacterium Myxococcus Xanthus*, 404 NATURE 598 (2000).
[6] William Hamilton, *The Genetical Evolution of Social Behavior*, 37 JOURNAL OF THEORETICAL BIOLOGY 1 (1964).
[7] Robert Trivers, *The Evolution of Reciprocal Altruism*, 46 QUARTERLY REVIEW OF BIOLOGY 35 (1971).
[8] Functional magnetic resonance imaging (fMRI) reveals areas of the brain associates specifically with cooperative behaviors. James K. Rilling, et al., *A Neural Basis for Social Cooperation*, 35 NEURON 395 (2002).
[9] Indeed, there may be no particular gene specifically associated with competitiveness—although we have yet to see—but the "selfish gene" is a widely used term popularized by Richard Dawkins. *See* RICHARD DAWKINS, THE SELFISH GENE (1990).
[10] Research shows that humans are in essence natural-born liars. David Livingstone Smith, *Natural-Born Liars*, SCIENTIFIC AMERICAN MIND (June 2005).
[11] *See* Gregory Todd Jones, *Trust, Institutionalization, & Corporate Reputations: Public Independent Fact-Finding from a Risk Management Perspective*, 13 UNIVERSITY OF MIAMI BUSINESS LAW REVIEW 121 (2005); Ernst Fehr & John A. List, *The Hidden Costs and Returns of Incentives—Trust and Trustworthiness Among CEOs*, 2 JOURNAL OF THE EUROPEAN ECONOMIC ASSOCIATION 743 (2004); R. William Ide & Douglas H. Yarn, *Public Independent Fact-Finding: A Trust-Generating Institution for an Age of Corporate Illegitimacy and Public Mistrust*, 56 VANDERBILT LAW REVIEW 1113 (2003); Paul J. Zak, *Trust*, 7 JOURNAL OF FINANCIAL TRANSFORMATION 13 (2003); Stephen Knack & Paul J. Zak, *Building Trust: Public Policy, Interpersonal Trust, and Economic Development*, 10 SUPREME COURT ECONOMIC REVIEW 91 (2002); Paul J. Zak & Stephen Knack, *Trust and Growth*, 111 ECONOMIC JOURNAL 295 (2001); Stephen Knack & Phillip Keefer, *Does Social Capital Have an Economic Payoff? A Cross-Country Investigation*, 112 QUARTERLY JOURNAL OF ECONOMICS 1251 (1997); Joyce Berg, et al., *Trust, Reciprocity, and Social History*, 10 GAMES AND ECONOMIC BEHAVIOR 12 (1995); JAMES S. COLEMAN, FOUNDATIONS OF SOCIAL THEORY (1990); Kenneth Arrow, *Gifts and Exchanges*, 1 PHILOSOPHY AND PUBLIC AFFAIRS 343 (1972).
[12] Paul J. Zak, *Trust: A Temporary Human Attachment Facilitated by Oxytocin*, 28 BEHAVIORAL AND BRAIN SCIENCES 368 (2005); Paul J. Zak, et al., *The Neurobiology of Trust*, 1032 ANNALS OF THE ACADEMY OF SCIENCES 224 (2004); Michael Kosfeld, et al., *Oxytocin Increases Trust in Humans*, 435 NATURE 673 (2005); Brooks King-Casas, et al., *Getting to Know You: Reputation and Trust in a Two-Person Economic Exchange*, 308 SCIENCE 78 (2005); Richard A. Depue & Jeannine V. Morrone-Strupinsky, *A Neurobiological Model of Affiliative Bonding: Implications for Conceptualizing a Human Trait of Affiliation*, 28 BEHAVIORAL AND BRAIN SCIENCES 313 (2005); Ernst Fehr, et al., *Neuroeconomic Foundations of Trust and Social Preferences*, AMERICAN ECONOMIC REVIEW (forthcoming); Thomas Insel & Larry Young, *The Neurobiology of Attachment*, 2 NEUROSCIENCE 129 (2001).
[13] Zak, *supra* note 12; Michael Kosfeld, et al., *supra* note 12; Antonio Damasio, *Brain Trust*, 435 NATURE 571 (2005); Paul J. Zak, et al., *supra* note 12.
[14] King-Casas, et al., *supra* note 12.
[15] Zak, *supra* note 12.
[16] Biological evidence of the theory of mind function is provided by studies of people who suffer from schizophrenia, autism, or Asperger's syndrome in whom the attribution of mental states is impaired. Tom F. D. Farrow, et al., *Investigating the Functional Anatomy of Empathy and Forgiveness*, 12 NEUROREPORT 2433 (2001). Sally and Hill investigated the relationship between this "mentalising" and performance in social dilemma games—in

children and adults with and without autistic spectrum disorders. Their results suggest that strategic responses, both in the well-known prisoner's dilemma and in the use of strategically unequal offers in bargaining tasks, are associated with this mentalising ability. Elisabeth Hill & David Sally, *Dilemmas and Bargains: Autism, Theory-of-Mind, Cooperation, and Fairness*, (Inst. of Cognitive Neuroscience, Working Paper 2005) (*available at* http://ssrn.com/abstract=407040). Elisabeth Hill, et al., *Does Mentalising Ability Influence Cooperative Decision-Making in a Social Dilemma? Introspective Evidence from a Study of Adults with Autism Spectrum Disorder*, 11 JOURNAL OF CONSCIOUSNESS STUDIES 144 (2004); David Sally, *Into the Looking Glass: Discerning the Social Mind Through the Mindblind*, 18 ADVANCES IN GROUP PROCESSES 99 (2001). Successful social interaction seems to depend on an ability to get your mind around the minds of others.

[17] Research on canine play-fighting behavior shows the large role of signaling in communicating whether individuals are merely playing or are actually being aggressive, *see* Marc Bekoff, *Play Signals as Punctuation: The Structure of Social Play in Canids*, 132 BEHAVIOUR 419 (1995).

[18] Paul Ekman & Wallace V. Friesen, *Constants Across Cultures in the Face and Emotion*, 17 JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY 124 (1971).

[19] Paul Ekman & Wallace V. Friesen, *Nonverbal Leakage and Clues to Deception*, 32 PSYCHIATRY 88 (1969).

[20] R. DUNBAR, GROOMING, GOSSIP AND THE EVOLUTION OF LANGUAGE (1996).

[21] COLIN CAMERER, ET AL., ADVANCES IN BEHAVIORAL ECONOMICS (2004).

[22] Martin A. Nowak, et al., *Fairness Versus Reason in the Ultimatum Game* 289, SCIENCE 1773 (2000).

[23] Gary Bolton & Rami Zwick, *Anonymity Versus Punishment in Ultimatum Bargaining*, 10 GAMES AND ECONOMIC BEHAVIOR 95 (1995); Werner Güth & Reinhard Tietz, *Ultimatum Bargaining Behavior: A Survey and Comparison of Experimental Results*, 11 JOURNAL OF ECONOMIC PSYCHOLOGY 417 (1990); Richard Thaler, *The Winner's Curse*, 2 JOURNAL OF ECONOMIC PERSPECTIVES 191 (1988); Werner Güth, et al., *An Experimental Analysis of Ultimatum Bargaining*, 3 JOURNAL OF ECONOMIC BEHAVIOR AND ORGANIZATION 367 (1982).

[24] Ernst Fehr & Klaus Schmidt, *Theories of Fairness and Reciprocity—Evidence and Economic Applications* (Institute for Empirical Research in Economics, Working Paper No. 75, 2000) (available at http://www.uibk.ac.at/c/c4/c409/kerschbamer/s05/LS-Fehr-Schmidt-a.pdf).

[25] Sarah F. Brosnan & Frans B.M. de Waal, *Socially Learned Preferences for Differentially Rewarded Tokens in the Brown Capuchin Monkey, Cebus Apella*, 119 JOURNAL OF COMPARATIVE PSYCHOLOGY 133 (2004); Sarah F. Brosnan & Frans B.M. de Waal, *Monkeys Reject Unequal Play*, 425 NATURE 297 (2003).

[26] Gregory T. Jones, *The Social Evolution of Strategic Forgiveness* (unpublished simulation results) (on file with author); IVAR KOLSTAD, THE EVOLUTION OF SOCIAL NORMS (2003); Karl Sigmund, et al., *The Economics of Fair Play*, 286 SCIENTIFIC AMERICAN 83 (2002); Nowak, et al., *supra* note 22; KEN BINMORE, GAME THEORY AND THE SOCIAL CONTRACT: PLAYING FAIR (2000).

[27] Jörg Oechssler, *Intentions Matter: Lessons from Bargaining Experiments*, 159 JOURNAL OF INSTITUTIONAL AND THEORETICAL ECONOMICS 195 (2003); Armin Falk, et al., *On the Nature of Fair Behavior*, 41 ECONOMICS INQUIRY 20 (1999).

[28] Alan Sanfey, et al., *The Neural Basis of Economic Decision-Making in the Ultimatum Game*, 300 SCIENCE 1755 (2003).

[29] In addition to a sense of substantive fairness, humans seem to have a taste for procedural fairness as reflected in the growing body of research around procedural justice. E. ALLAN LIND & TOM TYLER, THE SOCIAL PSYCHOLOGY OF PROCEDURAL JUSTICE (1988); JOHN THIBAUT & LAUREN WALKER, PROCEDURAL JUSTICE (1975). Again, consistent with social evolution theory, the primary concerns of individuals are whether the process signals their inclusion in the social group.

[30] Dominique J.F. de Quervain, et al., *The Neural Basis of Altruistic Punishment*, 305 SCIENCE 1254 (2004); Brian Knutson, *Sweet Revenge*, 305 SCIENCE 1246 (2004).

[31] Alan Sanfey, et al., *The Neural Basis of Economic Decision-Making in the Ultimatum Game*, 300 SCIENCE 1755 (2003).

[32] William D. Hamilton, *The Genetical Evolution of Social Behavior*, 37 JOURNAL OF THEORETICAL BIOLOGY 1 (1964).

[33] Trivers, *supra* note 7.

[34] ROBERT AXELROD, THE EVOLUTION OF COOPERATION (1984).

[35] Herbert Gintis, et al., *Explaining Altruistic Behavior in Humans*, 24 EVOLUTION AND HUMAN BEHAVIOR 153 (2003).

[36] Christophe Boesch, *Cooperative Hunting in Wild Chimpanzees*, 48 ANIMAL BEHAVIOR 653 (1994).

[37] For example, wage decisions are strongly reciprocated with work effort in labor markets, Ernst Fehr, et al., *Gift Exchange and Reciprocity in Competitive Experimental Markets*, 42 EUROPEAN ECONOMIC REVIEW 1 (1998); Ernst Fehr, et al., *Reciprocity as a Contract Enforcement Device: Experimental Evidence*, 65 ECONOMETRICA 833 (1997); Ernst Fehr, et al., *Does Fairness Prevent Market Clearing?* 108 QUARTERLY JOURNAL OF ECONOMICS 437 (1993), altruistic punishment of self-interested behavior is common in the ultimatum game, Colin Camerer & Richard Thaler, *Ultimatums, Dictators, and Manners*, 9 JOURNAL OF ECONOMIC PERSPECTIVES 209 (1995); Alvin E. Roth, et al., *Bargaining and Market Behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: An Experimental Study*, 81 AMERICAN ECONOMIC REVIEW 1068 (1991); Güth & Tietz, *supra* note 23, and costly punishment is doled out to free riders in public goods games; Ernst Fehr & Simon Gächter, *Altruistic Punishment in Humans*, 415 NATURE 137 (2002); Ernst Fehr & Simon Gächter, *Cooperation and Punishment*, 90 AMERICAN ECONOMIC REVIEW 980 (2000); Ernst Fehr & Simon Gächter, *Fairness and Retaliation: The Economics of Reciprocity*, 14 JOURNAL OF ECONOMIC PERSPECTIVES 159 (2000); Simon Gächter & Ernst Fehr, *Collective Action as a Social Exchange*, 39 JOURNAL OF ECONOMIC BEHAVIOR AND ORGANIZATION 341 (1999); Elinor Ostrom, et al., *Covenants With and Without a Sword: Self-Governance Is Possible*, 86 AMERICAN POLITICAL SCIENCE REVIEW 404 (1992); Toshio Yamagishi, *The Provision of a Sanctioning System as a Public Good*, 51 JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY 265 (1986).

[38] Including wage setting by firms, TRUMAN F. BEWLEY, WHY WAGES DON'T FALL DURING A RECESSION (2000), tax compliance, James Andreoni, et al., *Tax Compliance*, 36 JOURNAL OF ECONOMIC LITERATURE 818 (1998), and cooperation in the protection of local environmental public goods. ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990); JAMES ACHESON, THE LOBSTER GANGS OF MAINE (1988).

[39] Frans B.M. de Waal & Jennifer J. Pokorny, *Primate Conflict Resolution and Its Relation to Human Forgiveness, in* HANDBOOK OF FORGIVENESS 17 (Everett L. Worthington, Jr. ed., 2005); FILIPO AURELI & FRANS B.M. DE WAAL, NATURAL CONFLICT RESOLUTION (2000); Frans B.M. de Waal, *Primates: A Natural Heritage of Conflict Resolution*, 289 SCIENCE 586 (2000); Josep F. Call, et al., *Reconciliation Patterns Among Stumptail Macaques: A Multivariate Approach*, 58 ANIMAL BEHAVIOR 165 (1999); Frans B.M. de Waal, *Reconciliation Among Primates: A Review of Empirical Evidence and Unresolved Issues, in* PRIMATE SOCIAL CONFLICT 111 (William A. Mason & Sally P. Mendoza eds., 1993); Frans B.M. de Waal & Angeline van Roosmalen, *Reconciliation and Consolation Among Chimpanzees*, 5 BEHAVIORAL ECOLOGY AND SOCIOBIOLOGY 55 (1979).

[40] Jones, *supra* note 26.

[41] Forgiveness is related to empathy, Tania Singer & Ernst Fehr, *The Neuroeconomics of Mind Reading and Empathy*, (IZA Discussion Paper No. 1647; IEW Working Paper Series No. 222) (July 2005), *available at* http://ssrn.com/abstract=747904; Stephanie D. Preston & Frans B.M. de Waal, *Empathy: Its Ultimate and Proximate Bases*, 25 BEHAVIORAL AND BRAIN SCIENCES 1 (2002); Filipo Aureli & Colleen M. Schaffner, *Empathy as a Special Case of Emotional Mediation of Social Behavior*, 25 BEHAVIORAL AND BRAIN SCIENCES 23 (2002), but recent investigations of the functional anatomy of the two judgments show that they are distinct. Tom F.D. Farrow & Peter W.R. Woodruff, *Neuroimaging of Forgivability*, *in* HANDBOOK OF FORGIVENESS 259 (Everett L. Worthington, Jr. ed., 2005); Tom F.D. Farrow, et al., *Investigating the Functional Anatomy of Empathy and Forgiveness*, 12 NEUROREPORT 2433 (2001). Researchers in the UK used functional magnetic resonance imaging (fMRI) to examine the neural correlates of making empathic and forgivability judgments. *Id.*. Their results suggest that "attempting to understand others is physiologically distinct from determining the forgivability of their actions." *Id.* at 2435. While the two types of judgments shared activations in some areas of the brain, like the left frontal cortex, activation of the posterior cingulated gyrus was unique to forgiveness judgments. This is a region that with limbic connections has been associated with decision-making, attentional tasks, and problem-solving, including a sort of mental imagery that may extend to that of other people's views. *Id*. There seems to be a biological explanation for why we can put ourselves in another person's shoes without necessarily being able to forgive them.

[42] Erin A. O'Hara, *Apology and Thick Trust: What Spouse Abusers and Negligent Doctors Might Have in Common*, 79 CHICAGO-KENT LAW REVIEW 1055 (2004); Erin A. O'Hara & Douglas H. Yarn, *On Apology and Consilience*, 77 WASHINGTON LAW REVIEW 1121 (2002).

[43] O'Hara & Yarn, *supra* note 42, which shows the biological and economic reasoning. Kyoko Okamoto & Shuichi Matsumura, *The Evolution of Punishment and Apology: An Iterated Prisoner's Dilemma*, 14 EVOLUTIONARY ECOLOGY 703 (2000).

[44] Richard Thaler, *From Homo Economicus to Homo Sapiens*, 14 JOURNAL OF ECONOMIC PERSPECTIVES 133 (2000).