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When Nice Guys Finish First: The Evolution of Cooperation, The Study of Law, and the Ordering of Legal Regimes

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WHEN NICE GUYS FINISH FIRST: THE EVOLUTION OF COOPERATION, THE STUDY OF LAW, AND THE ORDERING OF LEGAL REGIMES

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This Note adds to the scholarship in the area of Evolutionary Analysis and the Law (EA). EA is a paradigm that comments on the implications of evolution on the law. EA recognizes that many complex human behaviors that the law seeks to regulate have evolutionary origins that remain relevant today. This Note details how an understanding of the evolutionary basis of cooperation can bring about favorable revisions and reforms in the law.

Following a review of the scientific foundation of EA, this Note sets forth the proposition that humans have an evolutionarily developed tendency to cooperate, an idea that contrasts the widely held belief that the evolutionary man is purely self-interested. This Note does, however, observe that the tendency to cooperate is not expressed at all times. This Note then explores the implications of EA on other areas of legal scholarship, such as behavioral law and economics, default rules in partnership law, and efficient mechanisms of trade. This Note concludes by addressing the concerns of EA critics and mapping a path for the future of EA.

Curiosity is an interesting thing. Proverbs tell us of its danger; our mothers implore us to stay clear of it. But in the end, where would we be without curiosity? Imagine life today absent Euclid's concern for lines and shapes, Newton's interest in gravity and mathematics, and Einstein's intrigue of space and time. Our lives today might closely resemble those of our hunter-gatherer ancestors. But because of curiosity, we live in a novel society ripe with scientific discovery and technological innovation. Given this, we might thank (or blame) curiosity for our present situation—for e-mails, airplanes, instant coffee machines, and, of course, reality TV.

It is this curiosity that no doubt encouraged Charles Darwin to amble onto the *H.M.S. Beagle* and embark on the five year journey that took him a hemisphere away from home. From Darwin's eagerness and desire to observe and catalogue nature, Victorian society learned of evolution and the engine that shaped mankind, natural selection. "Darwin made it plausible to believe that human beings, like plants and animals, originate in physical nature and in a manner that accords with causal laws."[1] To continue the theme, thank curiosity for Darwin's theory of evolution.

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1. ROGER SMITH, THE NORTON HISTORY OF THE HUMAN SCIENCES 453 (1997).

Theorists in the modern era, more than a century after Darwin put his thoughts to print, have since developed upon his ideas. For example, in 1972 Richard Dawkins' *The Selfish Gene* built upon the works of other biologists, primarily W.D. Hamilton and George C. Williams, to argue that evolution is not centered upon the success of the group, but the prosperity of the gene.[2] With this theory of micro-evolution came new views of human nature and the origins of behavior.

Despite this progress and the deep implications evolution has for the study of human nature, those engaged in the study of man have scarce considered, let alone incorporated, biology's findings. "Philosophy and the subjects known as 'humanities' are still taught almost as if Darwin had never lived."[3] Similarly, conventional economics, despite its focus on anticipating human decisions and the presumption of man as a rational actor, ignores the implications biology has for its theories. This omission must trouble biologists. As Richard Alexander noted, "[e]very thoughtful biologist has to be dismayed at the failure of the social sciences to acknowledge and absorb the principles of biology as the biologists believe they have acknowledged and absorbed the principles of chemistry and physics."[4] This failure of social science presents more than an epistemological concern. In the end, social science's inability to incorporate biology's findings more practically means its cathedral houses a number of aged ideas and axioms that need revision.

Thankfully, this denial by social science is not absolute. Psychology, for one, openly embraced biological advances of late. The temptation to do so must have been great; after all, biology provides the most advanced and complete structural and functional descriptions of the psychologist's ultimate subject—the brain. Evolutionary psychologists lead this project to fuse neo-Darwinism with studies of the human mind and behavior. For these scholars, "the designs of decision rationality and behavioral strategies are generated and shaped by natural selection and sexual selection in the evolutionary environments of adaptation."[5] Accordingly, the task of evolutionary psychology is "to show how elegantly the theory of

2. RICHARD DAWKINS, THE SELFISH GENE (1989). A number of theorists dissent with the gene-centered view of evolution, instead arguing that selection occurs at the level of the group. *See generally* V.C. WYNNE-EDWARDS, EVOLUTION THROUGH GROUP SELECTION (1986).

3. DAWKINS, *supra* note 2, at 1.

4. Richard D. Alexander, *The Evolution of Social Behavior*, 5 ANN. REV. ECOLOGY & SYSTEMATICS 325, 326 (1974).

5. Xiao-Tian Wang, *Introduction: Bounded Rationality of Economic Man: New Frontiers in Evolutionary Psychology and Bioeconomics*, 3 J. BIOECONOMICS 83, 85 (2001).

natural selection, as understood today, reveals the contours of the human mind."[6]

These Darwinian perspectives from biology and psychology enabled and encouraged evolution-sensitive approaches in other fields interested in human behavior. One of the most recent paradigms to emerge is the study of Evolutionary Analysis and the Law ("EA").[7] This view, as its name suggests, notes the implications evolution has for the law by specifically recognizing that "many complex human behaviors that the law seeks to regulate . . . have evolutionary origins in the deep ancestral past—origins that remain relevant today."[8] Studying the evolutionary sources of behavior provides insight into the nature and cause of human actions. Given that the law aims to both regulate and encourage particular behaviors, this understanding is invaluable.

At heart, EA's premise is simple: if the law seeks to affect behavior, it must understand the roots of behavior. Since behavior is a product of the brain, we must comprehend the brain. But to know the brain, and accordingly behavior, we must consider the qualities natural selection endowed it with. This path leads us straight to evolution: to examine the brain and behavior that natural selection created in humans so that they could survive and propagate in their ancestral environment, or as biologists refer to it, the environment of evolutionary adaptation (the "EEA").

What tangible help can EA provide? In recent years, legal scholars applied EA to re-evaluate legal theories, to explain the origins of laws, and to suggest amendments to our legal regime. In just a brief sampling, the movement endeavored to theorize behavioral law and economics,[9] explain the origins of and best response to

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6. ROBERT WRIGHT, THE MORAL ANIMAL: THE NEW SCIENCE OF EVOLUTIONARY PSYCHOLOGY 11 (1994). For a general review of evolutionary psychology, see HENRY PLOTKIN, EVOLUTION IN MIND: AN INTRODUCTION TO EVOLUTIONARY PSYCHOLOGY (1998).

7. A number of articles have been written as of late on EA. See, for example, Neel P. Parekh, Note, *Theorizing Behavioral Law and Economics: A Defense of Evolutionary Analysis and the Law*, 36 U. MICH. J.L. REFORM 209 (2002); Owen D. Jones, *Time-Shifted Rationality and the Law of Law's Leverage: Behavioral Economics Meets Behavioral Biology*, 95 NW. U. L. REV. 1141 (2001) [hereinafter Jones, *Time*]; Owen D. Jones, *Sex, Culture, and the Biology of Rape: Toward Explanation and Prevention*, 87 CAL. L. REV. 827 (1999) [hereinafter Jones, *Biology of Rape*]; Owen D. Jones, *Law, Emotions, and Behavioral Biology*, 39 JURIMETRICS J. 283 (1999); Owen D. Jones, *Evolutionary Analysis in the Law: An Introduction and Application to Child Abuse*, 75 N.C. L. REV. 1117 (1997) [hereinafter Jones, *Child Abuse*]; JOHN H. BECKSTROM, EVOLUTIONARY JURISPRUDENCE: PROSPECTS AND LIMITATIONS ON THE USE OF MODERN DARWINISM THROUGHOUT THE LEGAL PROCESS (1989).

8. Jones, *Child Abuse*, *supra* note 7, at 1121.

9. Parekh, *supra* note 7; Jones, *Time*, *supra* note 7.

rape,[10] define the roots of child abuse,[11] and account for the tragedy of the commons.[12] This Note hopes to add to this scholarship by detailing how an understanding of the evolutionary basis of cooperation can bring about favorable revisions and reforms in the law.

This examination of cooperation will follow traditional EA analysis. Part I will first review the applicable science behind evolution, including a brief primer on the brain and behavior. Having discussed these two, we can then understand the foundational principles of EA. In Part II the Note will examine the evolutionary strategies of altruism and reciprocity to show that humans, contrary to the popular conception of the evolutionary man as purely self-interested, are pre-wired to cooperate. Finally, in Part III, after citing the prevalence of cooperation in particular settings, the Note will discuss the implications this knowledge of cooperation has for legal scholarship and legal systems. It will primarily show how an awareness of cooperation can lead to reforms in legal theories, by partially theorizing behavioral law and economics, and in specific legal rules.

PART I: THE SCIENCE OF EA

A. Evolution

"Today the theory of evolution is about as much open to doubt as the theory that the earth goes round the sun. . . . "[13] The concept as most understand it is fairly simple: the fittest species are the ones that survive. This characterization is, however, remarkably crude. In attempts to better elucidate the theory of evolution and natural selection, biologists refined this depiction; in doing so, they showed that there is more to evolution than survival of the species. In fact, "the fundamental unit of selection . . . is not the species, nor the group, nor even, strictly, the individual. It is the gene, the unit of heredity."[14]

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10. Jones, *Biology of Rape*, *supra* note 7.

11. Jones, *Child Abuse*, *supra* note 7.

12. E. Donald Elliot, *The Tragedy of the Commons: Evolutionary Biology, Economics and Environmental Law*, 20 VA. ENVTL. L.J. 17 (2001).

13. DAWKINS, *supra* note 2, at 1.

14. *Id.* at 11. *Cf.* WYNNE-EDWARDS, *supra* note 2 (arguing evolution occurs at the level of the group).

How can this be true? After all, we see the results of evolution every day—it is the primacy of specific animal species, not of genes themselves. However, when considered, this species-centered view screams of naiveté. The process of evolution began long before humans, other animals, or even plants existed. It began with stable molecules, not living, but capable of replicating with speed and accuracy.[15] As these "replicators" amassed, they drained available resources: "[t]he primeval soup was not capable of supporting an infinite number of replicator molecules."[16] As a result, competition emerged. In order to survive, these replicators evolved what Dawkins refers to as survival machines.[17] These machines were at first merely receptacles—protective walls that shielded the replicators. But these machines, during the course of millions of years and "by a venerable and massive process of trial and error, known as natural selection,"[18] became more and more complex as the demands of the environment impressed greater stress on them. Eventually the survival machines took on bigger forms; what we now refer to as living organisms. The replicators first housed themselves in single-cells, then in multicellular life, and eras later, plants and animals.[19] What are these replicators? As Dawkins describes, "They are in you and in me; they created us, body and mind; and their preservation is the ultimate rationale for our existence. They have come a long way, those replicators. Now they go by the name of genes, and we are their survival machines."[20]

This seems a bit bizarre. But if we accept the reality of evolution through natural selection, it is the explanation that best explains our origin. The theory is dehumanizing in some respects: we are no more than passive hosts for parasitic genes. The joke, we might say, is on us. Once we realize, however, that the agenda of the genes does not devalue the nature of man, we can focus on selfish gene theory, as this view of micro-evolution is called, as an explanation of our origin and not as a tool for explaining who we are or what we should be.

With this understanding, we know that evolution selected for those survival machines that best preserved and propagated the genes which housed them. But an important distinction should be

15. DAWKINS, *supra* note 2, at 17.
16. *Id.* at 18.
17. *Id.* at 19.
18. MATT RIDLEY, GENOME: THE AUTOBIOGRAPHY OF A SPECIES IN 23 CHAPTERS 26 (1999).
19. DAWKINS, *supra* note 2, at 46–47.
20. *Id.* at 20.

made. Evolution did not shape life in the abstract; rather it operated in a specific environmental context. Evolutionary success stemmed from the capability to negotiate the environment of evolutionary adaptation, not just other organisms. Accordingly, the characteristics selected for were those that enabled us to tackle problems existing in the environment of evolutionary adaptation. Humans are therefore particularly adept to the ecological dilemmas present during their period of evolution, not those challenges peculiar to modern environments.

B. The Brain

The brain, like all of our features, was gradually crafted by natural selection. Just as evolution endowed us with opposable thumbs and two feet, it provided us with a brain weighing approximately three pounds and consisting of an amalgam of lobes and neural networks. But there is more to this. Along with supplying us with a physical brain, what we might call its hardware, evolution also imparted us with unique software.[21] Our brain is encoded with the ability to perform algorithms—functions aimed at solving problems. Human sight is the classic example.[22] Evolution conferred us with the hardware to capture images (the retina) and to transfer it to the brain (the optic nerve). But aside from this hardware, evolution also generated the software by which the brain could decipher and perceive this negative and even store this vision as a memory for later reference. Without this software, the hardware would be useless.

Because evolution created our brain, its structure and function reflect those adaptations which enhanced fitness relative to the environment. "Like other aspects of basic anatomy, the basic internal psychological mechanisms leading to many behavioral predispositions evolved under the challenges and selection pressures posed by particular environmental conditions."[23] In the instance of the brain, these environmental conditions are the problems that humans and their genetic predecessors faced during the long period of human physiological evolution.[24] The brain accordingly embod-

21. Some biologists refer to this "software" element of the brain as the "mind." *See, e.g.*, STEPHEN PINKER, HOW THE MIND WORKS (1998).

22. *See, e.g., id.* at 51.

23. Jones, *Time*, *supra* note 7, at 1167.

24. PINKER, *supra* note 21, at 21.

ies those algorithms required to negotiate the environment of evolutionary adaptation.

Note, however, that though natural selection favored a brain that enables us to survive, it did not provide us with the most advanced one because, "[f]orm follows function: the properties of an evolved mechanism reflect the structure of the task it evolved to solve."[25] Our brain is not a supercomputer simply because the environmental challenges we faced did not demand it to be so. Surviving and propagating in the EEA did not, for instance, require a capacity to understand combinatorial mathematics. Similarly, *Homo sapiens* is not *Homo economicus* because economic rationality was not a strategy necessary for our survival. As E. O. Wilson notes, "[b]iological capacity evolves until it maximizes the fitness of organisms for the niches they fill, and not a squiggle more."[26] As a result, we might say our brains are evolutionarily bounded.

This background helps show how evolutionary science might influence legal studies. After all, policies that require us to perform algorithms never selected for will rarely lead to the desired behavior. If, for example, the law expects us to make complex economic calculations in resolving tort disputes, such a rule might fail because evolutionary psychologists have shown that humans cannot perform many of the decisional tasks economics demands since the EEA would never have required our brains to "attain" these algorithms.[27] The relevance between evolutionary sciences and the

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25. Leda Cosmides & John Tooby, *Better than Rational: Evolutionary Psychology and the Invisible Hand*, 84 AM. ECON. REV. 327, 328 (1994).

26. EDWARD O. WILSON, CONSILIENCE: THE UNITY OF KNOWLEDGE 52 (1998). This general concept, that the brain's function is derived only with respect to the challenges it faced, is well summarized by the evolutionary psychologist Robert Wright:

> The point is just that it isn't correct to say that people's minds are designed to maximize fitness, their genetic legacy. What the theory of natural selection says, rather, is that people's minds were designed to maximize fitness in the environment in which those minds evolved. . . . The question, properly put, is always whether a trait would be in the 'genetic interest' of someone in the EEA, not in modern American or Victorian England or anywhere else. Only traits that would have propelled the genes responsible for them through the generations in our ancestral environments should, in theory, be part of human nature today.

WRIGHT, *supra* note 6, at 37–38.

27. For more on the dissonance between what economics demands of us and what evolution has enabled us to do, see, for example, Catrin Rode & X.T. Wang, *Risk-Sensitive Decision Making Examined Within an Evolutionary Framework*, 43 AM. BEHAV. SCIENTIST 926 (2000).

law becomes even greater when we realize that the brain's algorithms result in behavior.

C. Behavior

Behavior has multiple definitions. It commonly refers to how people carry themselves, both in how they act and in what they say. For the purposes of this Note, behavior is any muscular or physiological response.[28] What effectuates these responses? As noted above, behavior originates in the brain. Leda Cosmides and John Tooby explain this when they write that the "brain is a complex computational device, a system that takes sensory information as input, transforms it in various ways, stores it, analyzes it, integrates it, applies decision rules to it, and then translates the output of those rules into the muscular contractions that we call 'behavior.' "[29]

The process Cosmides and Tooby note, however, begins even earlier; it commences with evolution. Legal scholar Owen Jones states this more explicitly: "Behavior," he opines, "requires both perception and information processing. Perception and information processing are thoroughly dependent on brain function. Brain function reflects the evolutionary processes that built the brain's intricate functionality. Therefore, behavior—the principal output of the brain—reflects evolutionary processes."[30] Once we consider the role evolution has in forming the brain, we realize that evolution selected for, via the brain, behaviors that increased fitness in the EEA.[31]

For many, such a conclusion is a bit brash. To them, this argument stinks of determinism and condemns "individual people to a heartless fate written in their genes before they were born."[32] This Note cannot attempt to respond to these claims. Rather, it assumes

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28. This simple definition is one commonly used by biologists. *See, e.g.*, DAWKINS, *supra* note 2, at 47 (defining behavior as "the trick of rapid movement which has been largely exploited by the animal branch of survival machines.").

29. Cosmides & Tooby, *supra* note 25, at 328.

30. Jones, *Time*, *supra* note 7, at 1165.

31. *Id.* at 1167; Leda Cosmides & John Tooby, *Cognitive Adaptations for Social Exchange*, *in* ADAPTED MIND: EVOLUTIONARY PSYCHOLOGY AND THE GENERATION OF CULTURE 163 (Barkow et. al. eds., 1992). Robert Wright emphasizes this with the following: "[t]he thousands and thousands of genes that influence human behavior—genes that build the brain and govern neurotransmitters and other hormones, thus defining our 'mental organs'—are here for a reason. And the reason is that they goaded our ancestors into getting their genes into the next generation." WRIGHT, *supra* note 6, at 28.

32. RIDLEY, *supra* note 18, at 91–92.

that man is not the *tabula rasa* that Locke envisioned,[33] but is instead endowed by evolution with certain structural and behavioral tendencies. This innateness, however, does not always compel us to act in a particular manner. A genetic foundation of behavior, for one, does not preclude human free will.[34] Personal morality can trump much behavior, helping us to abandon that innateness which conflicts with our mores; cultural norms and legal rules curb those natural behaviors deemed unfavorable. With these competing forces, as Dawkins notes, "[w]e alone, on earth, can rebel against the tyranny of the selfish replicators."[35] In any case, EA will have no use for those who disagree with this assumption. But for those who believe that an internally consistent understanding of evolution naturally leads to some level of innateness, EA shows promise.

D. Concluding Part I on the Science of EA

The foundational science discussed above directs that behavior, the principle subject upon which the law focuses, is a function of evolution. As noted above, this understanding is remarkably relevant to legal theory. The law's principal aim, in both prohibiting some acts and motivating others, is to regulate behavior. In light of this, an incomplete or inaccurate understanding of behavior will preclude effective or optimal rules. To illustrate, imagine a behavior that is predisposed by natural selection. If this behavior runs counter to our customs, the law will attempt to curb it. But if such behavior is innate, we may be unable to prevent it with conventional legal rules. Knowing whether such a behavior is in our nature can effect how we fashion remedies and regulations.[36]

In such an instance, how can we discover whether the behavior in question is hard-wired in the first place? As noted in the preceding pages, "not only are all aspects of structure and function of organisms to be understood solely as products of selection, but

33. JOHN LOCKE, AN ESSAY CONCERNING HUMAN UNDERSTANDING, bk. II, chap. 1, at 26 (Raymond Wilburn ed. 1947) (1690).

34. *See generally* DANIEL C. DENNETT, FREEDOM EVOLVES (2003).

35. DAWKINS, *supra* note 2, at 201.

36. Jones' "Law of law's leverage" illustrates this. He notes that: "[t]he magnitude of legal intervention necessary to reduce or to increase the incidence of any human behavior will correlate positively or negatively, respectively with the extent to which a predisposition contributing to that behavior was adaptive for its bearers, on average, in past environments." Jones, *Time*, *supra* note 7, at 1190.

because of their peculiarly direct relationship to the forces of selection, behavior and life history phenomena, long neglected by the evolutionists, may be among the most predictable of all phenotypic attributes."[37] A study of natural selection and the EEA can therefore provide insight as to what human behaviors are native.

An understanding of the evolutionary roots of behavior also implicates what the law can expect of us as actors. Take, for example, the reasonable person standard. The law, drawing mainly from Enlightenment philosophy and from the personal experiences of judges, created a fictional persona against whom all must be measured. This reasonable person, however, may be someone very unlike the biological person. Perhaps, then, where the reasonable person standard supercedes the biological person, the legal baseline needs to be changed (normative standards permitting).

This discussion is a bit abstract. The aim is to highlight some of the implications this understanding of behavior has for the law. But perhaps the best way to emphasize the point is to more concretely examine the focus of this Note—cooperation. As will be seen, recognition that cooperation, in some contexts, is an evolutionarily developed instinctive behavior enables us to understand behavioral law and economics, default rules in partnership law, and efficient mechanisms of trade.

PART II: THE EVOLUTION OF COOPERATION

Evolution is commonly understood as a zero-sum competition where the fittest survive and the weak wane into extinction. This understanding leads to the somewhat frightening proposition often cited of evolution that man and all other animals are purely self-interested. Under this view, at least in our ancestral environments and before cultural norms evolved, evolution forced us into Hobbesian competition.

In reality, this unbridled competition does not exist. In our day-to-day lives, cooperation abounds. We tip on the road, we give to the homeless, and we constantly do favors for others, giving up valuable time and resources to ends that provide us with little or no tangible benefit. This cooperation is not specific to humans; it is endemic to all living organisms.[38] The reality of cooperation, when

37. Alexander, *supra* note 4, at 325.

38. Robert Axelrod & William D. Hamilton, *The Evolution of Cooperation*, 211 SCIENCE 1390 (1981), *reprinted in* ROBERT AXELROD, THE EVOLUTION OF COOPERATION 88–89 (1984) [hereinafter Axelrod & Hamilton, *The Evolution of Cooperation*] ("The theory of evolution is

considered along with evolution, leads many to ask the following question: "If life is a competitive struggle, why is there so much cooperation about? And why, in particular, are people such eager cooperators?"[39]

The phenomenon of the division of labor provides a partial answer.[40] Humans in all cultures segregate tasks. Some members of primitive societies, for example, hunt and gather while others care for children. Modern capitalism similarly relies on the division of labor for efficient production and later consumption. Even our bodies themselves exemplify this cooperation where each of our physiological components perform specialized biological tasks that benefit one another—"a red blood cell is as valuable to a liver cell as vice versa."[41] In these instances, the division of labor—a system of cooperation—is favorable because together each person or cell can achieve more than either can do on its own. At heart, it is a cooperation that grows out of self-interest.

Adam Smith himself recognized that cooperation stems not from humanity, but self-interest. He writes:

> [M]an has almost constant occasion for the help of his brethren, and it is vain for him to expect it from their benevolence only. He will be more likely to prevail if he can interest their self-love in his favour, and show them that it is for their own advantage to do for him what he requires of them. . . .[42]

As cooperation can develop in relationships among selfish individuals, cooperative behavior can also emerge from selfish genes where the long-term rewards from this strategy are greater for each actor than the short-term rewards of unilateral self-interest.[43]

An analysis of selfish-gene theory makes the ascendancy of cooperation even more clear. As a reminder, micro-evolution holds that, "always, without exception, living things are designed to do things that enhance the chances of their genes or copies of their genes surviving or replicating."[44] Accordingly, during natural

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based on the struggle for life and the survival of the fittest. Yet cooperation is common between members of the same species and even between members of different species."). See *infra* notes 73–77 for examples of cooperation between non-humans.

39. MATT RIDLEY, THE ORIGINS OF VIRTUE 5 (1996).

40. *Id.* at 41.

41. *Id.*

42. ADAM SMITH, THE WEALTH OF NATIONS, bk. 1, ch. II (Edwin Cannan ed., The Modern Library 1994) (1796).

43. RIDLEY, *supra* note 39, at 132.

44. *Id.* at 18.

selection, those genes that propagated were ones that encoded for behaviors that enabled the survival machine to live and reproduce. These behaviors could embody any number of strategies: "retreat, conciliation or living and letting live."[45] But the ones selected for would have to provide the best methods of dealing with those dilemmas that confronted us during the EEA. During this time, the primary challenges to animals came from interactions between kin and a limited set of non-kin.[46] As will be shown below, cooperation in these relationships was the strategy that best increased a replicator's inclusive fitness. Accordingly, cooperative behavior emerged as an innate tendency—an evolved algorithm naturally applied given specific environmental conditions.

So from selfish genes sprang unselfish survival machines. As for us, while our genes have a selfish aim, mankind consistently (though not universally) expresses unselfish behavior. In the end, we learn that though "a predominant quality to be expected in a successful gene is ruthless selfishness in individual behavior. . .we shall see, there are special circumstances in which a gene can achieve its own selfish goals best by fostering a limited form of [cooperation] at the level of individuals."[47] What are these special circumstances? They arise during interactions between kin and dealings between repeat transactors; they are, in the jargon of evolutionary biology, altruism and reciprocity.[48]

A. Altruism

We begin our discussion of altruism with a brief observation from the cognitive neuroscientist Steven Pinker. He writes, "Homo sapiens are obsessed with kinship. All over the world, when people are asked to talk about themselves, they begin with their parentage and family ties, and in many societies, especially foraging groups, people rattle off endless genealogies."[49] The connection does not end with mere ancestral recognition and association. Rather, when we discover one is related to us, we feel a certain attraction and fidelity towards them. We take in the lost cousin. We rarely deny a parent, sibling, or child in need. And we often make remarkable

45. PINKER, *supra* note 21, at 428.

46. *Id.* at 429.

47. DAWKINS, *supra* note 2, at 2.

48. To confuse the issue a bit, altruism is also known as kin selection and reciprocity is alternatively termed reciprocal altruism.

49. PINKER, *supra* note 21 at 430.

sacrifices so that our kin may live a better life, even when doing so means threatening our own existence. How can this cooperation be explained, particularly in light of our selfish genes? As noted above, such behavior emerges because it, in the long term, increases the probability that genes will propagate when compared with the strategy of short term self-interest.

This realization was first made by William D. Hamilton.[50] In a short but monumental article in *The American Naturalist*, Hamilton explained when altruism might emerge with the following equation:

$$C < B(R)$$

where (C) is the cost of helping another, (B) is the benefit to the recipient's reproduction, and (R) is Wright's coefficient of relatedness (e.g. 1/2 for siblings and parents, 1/4 for grandparents, nephews, nieces, uncles and aunts, and 1/8 for a first cousin).[51] This formula, later termed Hamilton's Rule, means the following:

> Every altruistic behavior has certain, in principle measurable, actual or potential costs for the donor and benefits for the recipients. A particular behavior will evolve if the cost of the behavior to the donor is outweighed by the benefits to the recipient, those benefits being weighed by the degree of genetic relatedness between donor and recipient.[52]

But how does this make any sense? Why, even when the cost of an altruistic act to an individual is less than the benefit to a related party, would one help another? Recall that evolution is about the survival of genes, not the individual. Also note that your relatives share a certain percentage of genes in common with you—100% with identical twins, 50% with parents and siblings, and so on. Accordingly, while a sacrificial act may limit one's life, or even end it,

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50. *See* William D. Hamilton, *The Evolution of Altruistic Behavior*, 97 AM. NATURALIST 354 (1963), *reprinted in* 1 WILLIAM D. HAMILTON, THE NARROW ROADS OF GENELAND: EVOLUTION OF SOCIAL BEHAVIOR 6 (1996) [hereinafter Hamilton, *Altruism*]. *See also* William D. Hamilton, *The Genetical Evolution of Social Behavior, I & II*, 7 J. THEORETICAL BIOLOGY 1 (1964), *in* 1 WILLIAM D. HAMILTON, THE NARROW ROADS OF GENELAND: EVOLUTION OF SOCIAL BEHAVIOR 6 (1996) [hereinafter Hamilton, *Evolution of Social Behavior*]. George C. Williams made a major contribution to the understanding of cooperation as well. GEORGE C. WILLIAMS, ADAPTATION AND NATURAL SELECTION (1966). The two might be considered the co-authors of biological altruism.

51. Hamilton's Rule, as this is termed, has been discussed in countless texts. An excellent discussion of this theory appears in DAWKINS, *supra* note 2, 90–108.

52. PLOTKIN, *supra* note 6, at 84.

where that act furthers one's relatives' survival and their prospects to reproduce, the genes still win.[53]

Pregnancy provides one example.[54] Both parties, mother and fetus, hope to survive, but given limited resources, both are in conflict. Among other things, the fetus manages to divest the mother of blood by limiting maternal control over the constriction of the artery that supplies the placenta.[55] This, in turn, results in high blood pressure for the mother. Also, there is a struggle for sugar: the fetus, hungry for its mother's energy, secretes hormones that block the effect of insulin.[56] All the while, the mother, in an attempt to conserve her own resources, produces more and more insulin.[57] As a result of this sugar battle, mothers occasionally develop gestational diabetes.

The conflict is clear, but because of Hamilton's Rule child rearing evolved and continues. As Hamilton posited, "[d]espite the principle of 'survival of the fittest' the ultimate criterion which determines whether G [a gene that tends to cause some kind of altruistic behavior] will spread is not whether the behavior is to the benefit of the behaver but whether it is to the benefit of the gene G."[58] In light of this, despite the risk imposed on the mother, pregnancy prevailed as a mode of reproduction because it enables a set of genes to successfully propagate. Again, the threat to the mother herself is not the heart of the matter; rather it is the benefit to her genes. Accordingly, behavior that ensured their survival, namely all the physiological relationships occurring during pregnancy, persisted so long as the costs of these interactions ultimately were less than the benefit to the genes.

Given this explanation, the prospect of cooperative behavior between related individuals becomes understandable. But there is one element missing. Altruism concerns acts that increase another's chance of survival at the expense of the altruist's. This leads to a paradox: "[b]y definition, altruists would be expected to have a lower reproductive success than the selfish rivals whom they help. Altruistic behavior should, therefore, disappear from the population. It shouldn't exist, yet apparently it does."[59] This is because real life is often a non-zero sum game. True, at times selfishness will

53. Hamilton, *Evolution of Social Behavior*, *supra* note 50, at 47.

54. *See* David Haig, *Genetic Conflicts in Human Pregnancy*, 68 Q. Rev. Biology 495 (1993).

55. RIDLEY, *supra* note 39, at 23.

56. *Id.*

57. *Id.*

58. Hamilton, *Evolution of Social Behavior*, *supra* note 50, at 47.

59. Mark Ridley & Richard Dawkins, *The Natural Selection of Altruism* 20, *in* ALTRUISM AND HELPING BEHAVIOR (J. Phillipe Rushton & Richard M. Sorrentino eds., 1981).

prevail over altruism, but often selfishness does not result in a detriment to others. Moreover, as will be shown in the following discussion of reciprocity, cooperation can succeed over selfishness because it, in the long term, proves the more evolutionary stable strategy. Given this global benefit to cooperativeness, altruism, as discussed here, will prevail because genes that code for helping relatives will result in the highest inclusive fitness. "With that advantage, genes for helping relatives will increase in a population over generations."[60]

B. Reciprocity

One thing is clear in the world of cooperation—unselfish acts are not restricted to related actors. After all, we see symbiotic relationships both inter- and intra-species. Take, for example, group living. This Note has already mentioned that division of labor is a cooperative strategy that exists between members of a society. But this shared responsibility occurs between both related and unrelated individuals. Though the !Kung San, a well-studied hunter-gatherer tribe from Africa, rely primarily on altruistic acts between related individuals for their daily survival, when these interactions prove inadequate, the !Kung extend cooperation to more distant kin and unrelated persons.[61] This cooperation between non-kin is also seen throughout the animal kingdom. For instance, in the presence of a predator, birds give warning calls to non-relatives even though such alarms draw the predator to the caller itself.[62]

We understand such cooperation among related individuals as increasing the inclusive fitness of a particular set of genes. From a biological perspective, mothers help their children in part because doing so enables the mother's genes to prosper into the future.[63]

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60. PINKER, *supra* note 21, at 429.

61. Polly Wiessner, *Taking the Risk out of Risky Transactions: The Forager's Dilemma*, *in* RISKY TRANSACTIONS: TRUST, KINSHIP, AND ETHNICITY 37 (Frank K. Salter, ed., 2002).

62. DAWKINS, *supra* note 2, at 169; Robert L. Trivers, *The Evolution of Reciprocal Altruism*, 46 Q. REV. BIOLOGY 35, 45 (1971).

63. This seemingly takes the altruism out of altruism, meaning cooperation is at heart selfish. Critics of the evolution of cooperation have argued that such a realization devalues helpful actions. As will be discussed later, this view fails to recognize that simply because our genes direct us to act in a particular manner, our behavior can still be recognized as a function of our own motives. As Dawkins writes, "it does not matter that [one] is under the order of his genes, rather than choosing a course of action of his own free will. The deed is what counts." DAWKINS, *supra* note 2, at 21. Accordingly, mothers in fact take care of their children because they love them, not simply because their "genes" force them to do so.

But how can selfish gene theory explain cooperation between unrelated individuals? The answer again relies on a focus on the greater long-term benefits of cooperation as compared to the short-term benefits of selfishness. This understanding underlies the theory of reciprocity.

Reciprocity is surely a familiar concept. Dawkins modestly defined it as embodying the proverbial principle of "You scratch my back, I'll scratch yours,"[64] but more complex definitions exist. For example, political scientist Elinor Ostrom writes:

> Reciprocity refers to a family of strategies that can be used in social dilemmas involving (1) an effort to identify who is involved, (2) an assessment of the likelihood that others are conditional cooperators, (3) a decision to cooperate initially with others if others are trusted to be conditional cooperators, (4) a refusal to cooperate with those who do not reciprocate, and (5) punishment of those who betray trust.[65]

Regardless of the definition used, a complete understanding of reciprocity requires an examination of how this strategy is an evolutionarily endorsed behavior for organisms, particularly humans.

William Hamilton, the biologist who introduced kin selection to the world, traveled to a symposium on "Man and Beast" in 1969. There, he met Robert Trivers, a graduate student in biology.[66] Trivers presented Hamilton with a paper detailing his ideas of "reciprocal altruism" (what this Note refers to as reciprocity). In it, Trivers attempted to explain cooperation at large, rather than cooperation simply between kin. Hamilton encouraged Trivers to develop his ideas and publish his findings, which Trivers did two years later in a *Quarterly Review of Biology* article entitled "The Evolution of Reciprocal Altruism."[67]

In this paper, Trivers describes how self-interested actors, on the level of the gene or the individual, could give rise to remarkable levels of cooperation. The argument essentially expresses itself in the Golden Rule—do unto others as you would have done to you. Though a gross oversimplification, Trivers showed that reciprocity—the exchange of beneficial acts between transactors—can explain a number of instances of cooperation that exist in our en-

64. DAWKINS, *supra* note 2, at 179.

65. Elinor Ostrom, *A Behavioral Approach to the Rational Choice Theory of Collective Action: Presidential Address, American Political Science Association*, 92 AM. POL. SCI. REV. 1, 10 (1998).

66. WILLIAM D. HAMILTON, 1 NARROW ROADS TO GENELAND: THE EVOLUTION OF SOCIAL BEHAVIOR 262–3 (1996).

67. Trivers, *supra* note 62.

vironment and among non-related individuals. He relied on the concept repeated throughout this Note—that a concern for oneself can give rise to cooperation where cooperation benefits genes in the long run. In essence, "A favour done by one animal could be repaid by a reverse favour later, to the advantage of both, so long as the cost of doing the favour was smaller than the benefit of receiving it. Therefore, far from being altruistic, social animals might be merely reciprocating selfishly desired favours."[68] Trivers opined that this program of constant cooperative behavior can explain mutual benefits between the simplest organisms to a number of common human behaviors, including helping in times of danger, sharing food, caring for the sick, aiding the young and old, and imparting knowledge.[69]

So we again see how cooperation might prevail. But as noted in the section on altruism, evolution seems to predict that actors who cooperate can be exploited to the point of extinction by those who do not. A transactor—one we will call a "cheater" or "defector"—may conveniently forget to return the back scratching. After years of such behavior, cheaters would prevail over their gullible, though kind, counterparts. Nice guys, in essence, would finish last.

This conclusion, however, proves inaccurate. Game theorists who embraced the neo-Darwinian dictates of micro-evolution have shown that organisms that cooperate prevail over those that do not. John Maynard Smith, for one, noted that, "just as rational individuals should adopt strategies like those predicted by game theory as the least worst in any circumstances, so natural selection should design animals to behave instinctively with similar strategies."[70] This method would predict behavior that makes both players better off at the end of the game—what Smith called an evolutionary stable strategy and what economists refer to as the Nash Equilibrium. To demonstrate this, Smith used a tool common to game theorists, the Prisoner's Dilemma. In the end, Smith reasoned that those organisms, called Retaliators, who cooperated frequently while punishing defection, would prevail in repeated Prisoner Dilemmas.

This theory was confirmed some ten years later by Robert Axelrod, political scientist at the University of Michigan.[71] With the advent of computers, game theorists were able to perform

68. RIDLEY, *supra* note 39, at 61.
69. Trivers, *supra* note 62, at 45.
70. J. Maynard Smith & G. R. Price, *The Logic of Animal Conflict*, 246 NATURE 15 (1973).
71. *See generally* Axelrod & Hamilton, *The Evolution of Cooperation*, *supra* note 38.

repeated runs of a variety of problems. Axelrod, particularly interested in the logic of cooperation, set up a mass Prisoner Dilemma's game and invited people to submit programs embodying particular strategies to see which approach was most successful at prevailing in this game. After a number of trials Axelrod revealed the winner, a program entitled "Tit-for-Tat." This code embodied Smith's Retaliator. During the first round of the Dilemma, Tit-for-Tat cooperates. It then continues by doing whatever the other player does in the previous move. Essentially, Tit-for-Tat is a strategy of cooperation based on reciprocity. Given that it survived against a variety of other strategies, including purely self-interested ones that constantly defected in an attempt to exploit cooperation, it is clear that "cooperation based on reciprocity can thrive in a variegated environment."[72] Contrary to intuition, nice guys can finish first such that behavioral strategies of altruism and reciprocity would not have been routinely defeated by unbridled self-interest. Instead, cooperation through these methods emerged as innate behavioral tendencies selected for during evolution.

C. Environmental Evidence of Altruism and Reciprocity

It is one thing to assert through computer games, equations on paper, and ideas in print that cooperation is an evolved tendency—that our brain, the situs of human behavior, is one that impels us to act unselfishly—and another to demonstrate it. Thankfully, there is ample evidence from the zoological world showing that all types of organisms instinctively exhibit various levels of cooperation between both kin and non-kin.

Altruism, for example, accurately predicts how eusocial insects allocate their reproductive effort among close relatives.[73] Similarly, African vervet monkeys exhibit both altruism and reciprocity.[74] As Matt Ridley reports:

> When played a tape recording of a call from one monkey requesting support in a fight, another monkey will respond much more readily if the caller has helped it in the past. But if the two are closely related, the second monkey's response

72. *Id.* at 96.
73. Cosmides & Tooby, *supra* note 31, at 168.
74. RIDLEY, *supra* note 39, at 63.

does not depend so much on whether the first monkey has helped it.[75]

Perhaps the most frequently cited evidence of cooperation in nature is that of vampire bats.[76] Vampire bats, true to their name, feed on blood. Given the nature of their sustenance, these bats frequently return from feeding expeditions without any success. Absent cooperation from other bats, individual members whose unluckiness abounds, find the prospect of starvation a reality. There is, however, plenty of help in these communities. Successful bats—as predicted by evolution and reciprocity—drink more than they require for any one meal and regurgitate extra blood for those unable to find food. Because bats live in the same groups for long periods of time, this unselfishness is part of a repeated game, just like the iterated Prisoner's Dilemma. The bats play Tit-for-Tat, such that bats who previously donated blood will receive blood from a prior donee when needed, and bats who refuse to share blood do not get blood in return. As Ridley aptly summarizes, "[r]eciprocity rules the roost."[77]

Humans display the same tendencies. Earlier this Note discussed pregnancy and the division of labor as representations of altruism and reciprocity. Additional evidence comes from anthropological observations of hunter-gatherer societies. Why? Because individuals in these societies *still live in the EEA*. We can consider their environment and their behaviors to see which ones result from evolutionary pressures. Were we to simply rely on, for example, the behavior of those in modern Western civilization it would be difficult to see which behavioral tendencies were a result of evolution and which were caused by other factors, such as responses to today's cultural norms.

As Polly Wiessner notes, "[t]here are many statements in the forager literature that attest to the fact that kin are the ones most likely to engage in sharing and other forms of delayed reciprocity that serve to pool risk."[78] Furthermore, when people share with non-kin, they do so with an acute "mental ledger for reciprocation."[79] Cooperation during the hunt is demonstrative.[80] Despite

75. *Id.*

76. This discussion recasts the work of Gerald S. Wilkinson, *Reciprocal Food-Sharing in Vampire Bats*, 308 NATURE 181 (1984).

77. RIDLEY, *supra* note 39, at 63.

78. Wissener, *supra* note 61, at 25.

79. PINKER, *supra* note 21, at 505.

80. RIDLEY, *supra* note 39, at 108.

the temptation to free ride on the efforts of others, anthropological evidence shows that hunting groups formed. While working together, these entities also punished free riders by denying them food because of their failure to participate. Humans, it seems, act no differently than vampire bats.

Apart from this anthropological evidence, there is more proof that humans have an evolutionarily developed tendency to cooperate. As noted above, for reciprocity to develop individuals must be able to identify those who have cheated in the past so they can later punish defection. Remarkably, evolutionary psychologists have shown that we posses the inherent ability to identify cheaters in social contract exchanges.[81] In fact, we are better at identifying cheaters than discerning altruists.[82] In essence, the human brain can perform particular algorithms to identify and recall cheaters. Given this capacity, "Our lifestyles and our minds are particularly adapted to the demands of reciprocal altruism."[83] In the end, the existence of this faculty inductively demonstrates that we are reciprocal animals.

D. Concluding Part II on the Evolution of Cooperation

The preceding section detailing the evolution of cooperation demonstrates that humans (or all animals for that matter) have a tendency for cooperation. Though examined more fully in the 20th century, others knew of this reality in earlier years. In *The Descent of Man,* Darwin himself posited:

> As reasoning powers and foresight. . . became improved, each man would soon learn from experience that if he aided his fellow-men, he would commonly receive aid in return. From this low motive, he might acquire the habit of aiding his fellows. . . . Habits, moreover, followed during many generations probably tend to be inherited.[84]

But what Darwin refers to as a legacy of habits we now know is the inheritance of algorithms in the brain. Since cooperation was a

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81. Cosmides & Tooby, *supra* note 31, at 205.

82. RIDLEY, *supra* note 39, at 128. As more evidence of this ability, certain individuals who have experienced brain damage can no longer identify cheaters. *Id.* at 130.

83. PINKER, *supra* note 21, at 403.

84. WRIGHT, *supra* note 6, (quoting CHARLES DARWIN, THE DESCENT OF MAN, AND SELECTION IN RELATION TO SEX 163–64 (1871)).

favorable strategy during the EEA, particularly because of the small group life characteristic of the period, those who cooperated prevailed.

To summarize: "Our minds have been built by selfish genes, but they have been built to be social, trustworthy, and cooperative."[85] Because this encoding stems from our genetic blueprint, altruism and reciprocity are innate.[86] Part III outlines some of the implications this has for the law.

PART III: IMPLICATIONS

The discussion above demonstrated that humans are pre-wired to cooperate, although this predisposition is not expressed at all times. Since altruism and reciprocity evolved in the EEA, individuals should cooperate in those instances where conditions do not deviate far from the EEA. However, where circumstances diverge from the sort of dilemmas and social interactions present in the EEA, evolutionary cooperation may be absent. For example, in one-time market transactions between unknown parties, or relations between nations, the evolutionary psychologist would not expect altruistic or reciprocal cooperation.

This understanding of cooperation can alter social sciences that do not currently embrace the teachings of evolutionary biology. These fields, such as philosophy, political science, and economics, all posit conceptions of mankind on which their theories rely. But, as evolutionary analysis shows, a number of these foundational assumptions are in error. Economics, for example, relies on the conception of the rational man. But behavioral economics[87] and evolutionary studies of the brain as a cognitive processor demonstrate that man is far from rational.[88] Given this divergence, an evolutionarily sensitive analysis of human nature can lead to useful amendments to economic and other social science models.

This project of reform has particularly important implications for the law. In its attempt to regulate behavior, the law relies on

85. RIDLEY, *supra* note 36, at 249.

86. Hoffman et. al., *Behavioral Foundations of Reciprocity: Experimental Economics and Evolutionary Psychology*, 36 ECON. INQUIRY 335, 337 (1998).

87. *See, e.g.*, Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, *in* JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 3 (Daniel Kahneman et al. eds., 1982).

88. *See, e.g.*, Herbert A. Simon, *A Behavioral Model of Rational Choice*, 69 Q.J. ECON. 99 (1955); PINKER, *supra* note 21, at 20.

conceptions from philosophy, economics, and other social sciences in formulating legal policy. But in some instances, where the academic theories underpinning the law improperly characterize human nature, suboptimal laws will result. As Daniel Langevoort writes: "Nearly all interesting legal issues require accurate predictions about human behavior to be resolved satisfactorily."[89] Along this line, a proper understanding of behavior as provided by EA can help perfect the law as a motivational and regulatory tool.

James Wilson, the Enlightenment philosopher, offered support for this endeavor:

> In every art and in every disquisition, the powers of the mind are the instruments, which we employ; the more fully we understand their nature and their use, the more skillfully and the more successfully we shall apply them. In the sublimest arts, the mind is not only the instrument, but the subject also of our operations and inquiries. The poet, the orator, the philosopher work upon man in different ways and for different purposes. The statesman and the judge, in pursuit of the noblest ends, have the same dignified object before them. An accurate and distinct knowledge of his nature and powers, will undoubtedly diffuse much light and splendor over the science of the law. In truth, law can never attain either the extent or the elevation of science, unless it be raised upon the science of man.[90]

It is this project that Wilson discussed in the 1800s—fusing the science of man and the law—that EA attempts today. However, EA is not simply about explaining the behaviors evolution assigned us. That is primarily the realm of evolutionary biology and psychology. Instead, EA attempts to take the next step, combining the understanding of human nature revealed by evolutionary science with the law to recast legal rules predicated on false assumptions.

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89. Donald C. Langevoort, *Behavioral Theories of Judgment and Decision Making in Legal Scholarship: A Literature Review*, 51 VAND. L. REV. 1499 (1988). He goes on to state,

> Judges, policy makers, and academics invoke mental models of individual and social behavior whenever they estimate the desirability of alternative rules, policies, or procedures. Contemporary legal scholarship has come to recognize that if these predictions are naïve and intuitive, without any strong empirical grounding, they are susceptible to error and ideological bias.

Id. at 1499–1500.

90. JAMES WILSON, *Lectures on Law*, *in* 1 THE WORKS OF JAMES WILSON 207 (James De Witt Andrews ed.,1896).

At the same time, EA does not intend to overthrow the other explanatory schemes currently applied to the law. EA holds that, by and large, law and economics does a remarkably good job of creating and critiquing legal rules. Rather, EA should be applied in those instances where law and economics' predictions fall short and its incentive structure fails to motivate behavior.

Some of these applications appear in the existing EA literature. Owen Jones, currently the chief proponent of EA, introduced evidence of how the law at large (not just law and economics) misunderstands the nature of rape and child abuse.[91] Using evolutionary analysis, Jones demonstrated how reformulations of the law that acknowledge evolutionary input on human behavior might better prevent these terrible crimes. In another Note, I applied evolutionary analysis to employment discrimination to argue that the law's incomplete understanding of stereotyping results in severe under-regulation of discrimination in the workplace.[92] In applying an evolutionary informed view of stereotyping, I showed how the law should be reformed in order to ensure Congress achieves its articulated goals in regulating employment discrimination.[93]

This Note will continue in this vein by examining how an understanding of the evolution of cooperation applies to previous legal scholarship and can impact existing legal rules. First, this Note will add to the ongoing discussion on how EA can help theorize some of behavioral law and economics' ("BLE") observations.[94] Second, the Note will demonstrate how evolutionary cooperation can explain the equal sharing default rule in partnership law and help shape efficient regimes of trade.

A. Reforming Legal Scholarship: Theorizing Behavioral Law and Economics

Since its inception, law and economics has demonstrated impressive resilience. The paradigm, generally stated, holds that "legal rules are best analyzed and understood in light of standard

91. *See* Jones, *Biology of Rape*, *supra* note 7; Jones, *Child Abuse*, *supra* note 7.
92. Parekh, *supra* note 7.
93. *Id.* at 243–44.
94. For an earlier discussion of this, see Parekh, *supra* note 7; Jones, *Time*, *supra* note 7.

economic principles."[95] Its task "is to determine the implications of. . . rational maximizing human behavior in and out of markets, and its legal implication for markets and other institutions."[96] With this foundation, law and economics explains the bases of a number of laws and suggests revisions where appropriate. Given the parsimony of rational choice theory, its recommendations often lead to novel and efficient legal rules.

This success, however, is not absolute. A major flaw of law and economics is its assumption that individuals are rational actors. Empirical evidence amassed by behavioral economists and psychologists shows that man is far from completely rational. Legal scholars embraced these findings and examined law and economics from the new paradigmatic perspective of behavioral law and economics. These theorists revealed that a number of law and economics' predictions proved false, and hinted that for optimal legal regulation some rules based on the rationality principle needed amendment.[97]

Law and economics did not welcome the critique. Richard Posner, its vocal champion, questioned the applicability of behavioral explanations of human behavior for the law.[98] He further chided BLE for its dearth of parsimony.[99] But his main critique of BLE was that it lacked an underlying motivational premise akin to law and economics' rational choice theory. Posner wrote:

> [BLE] is undertheorized because of its residual, and in consequence purely empirical character. Behavioral economics is defined by its subject rather than by its method and its subject is merely the set of phenomena that rational-choice models (or at least the simplest of them) do not explain. It would not be surprising if many of these phenomena turned out to be unrelated to each other, just as the set of things that are not

95. *See, e.g.*, Christine Jolls et al., *A Behavioral Approach to Law and Economics*, *in* BEHAVIORAL LAW AND ECONOMICS 13, 14 (Cass R. Sunstein ed., 2000) [hereinafter BEHAVIORAL LAW AND ECONOMICS]. For a literature review of BLE scholarship see Langevoort, *supra* note 79. The generally cited reference to law and economics is RICHARD POSNER, ECONOMIC ANALYSIS OF THE LAW (1973).

96. Jolls, *supra* note 95, at 14.

97. *See generally* BEHAVIORAL LAW AND ECONOMICS, *supra* note 95. A major focus was the inadequacy of the economic model of rational choice. As Daniel Farber noted in his review of behavioral law and economics, "[t]he contribution of the behavioralists is to bring to bear an increasingly large and persuasive body of experimental evidence . . . that rational choice theory can be a poor predictor of human behavior." Daniel A. Farber, *Toward a New Legal Realism*, 68 U. CHI. L. REV. 279, 282–83 (2001) (book review).

98. Richard A. Posner, *Rational Choice, Behavioral Economics, and the Law*, 50 STAN. L. REV. 1551 (1998).

99. *Id.* at 1559.

> edible by man include stones, toadstools, thunderclaps, and the Pythagorean theorem. Describing, specifying, and classifying the empirical failures of a theory is a valid and important scholarly activity. But it is not an alternative theory.[100]

In essence, because BLE lacks a theory, Posner held it made little contribution to the prospective creation of rules.

Soon thereafter, EA entered the debate.[101] It agreed with Posner—without a theory, BLE suffered. Theories, as the philosophy of science has shown, serve a number of functions, among them highlighting causes.[102] Absent a theory, BLE is simply a laundry list of observations that provide little or no predictive utility. As Russell Korobkin notes, "[e]mpirical observation alone could serve as the basis for predicting behavior only if every possible future situation could be observed *ex ante* either in the real world or in a laboratory."[103] Theories do more—they provide explanations which enable us to predict behaviors rather than simply catalogue them *ex post.*

More centrally, EA held that evolutionary science itself could provide the missing motivational theory necessary to explain the ample experimental data accumulated by the behavioralists.[104] How so? BLE holds that humans are irrational given their observed departure from such economic concepts as expected utility theory and rational choice. Essentially, humans are unable to behave logically because of bounded willpower, bounded self-interest, and bounded rationality.[105] But EA more specifically explains this divergence between predicted and actual behavior by arguing that the cognitive defects BLE discovered are not truly defects at all. Rather they are "irrationalities" that result when a brain, programmed to perform only those algorithms present during the EEA, is challenged to tackle novel problems. Because the brain is specifically geared to solve those dilemmas humans and our genetic predecessors faced during hominid evolution, we are unable to perform a number of tasks, including the rational calculations demanded by

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100. *Id.* at 1559–60.

101. Parekh, *supra* note 7; Jones, *Time, supra* note 7.

102. *See generally* Parekh, *supra* note 7, 213–16.

103. Russell Korobkin, *A Multi-Disciplinary Approach to Legal Scholarship: Economics, Behavioral Economics, and Evolutionary Psychology*, 41 JURIMETRICS J. 319, 328 (2001).

104. *See generally* Parekh, *supra* note 7; Jones, *Time, supra* note 7. Posner himself hinted at the use of evolutionary science in explaining the findings of BLE. Posner, *supra* note 98, at 1561–64.

105. Jolls, *supra* note 95, at 14–16.

economics.[106] Given this, we can forecast that the type of behavior BLE observes—behavior that cannot be predicted by expected utility theory and rational choice—will arise when our evolutionarily bounded brain attempts to solve ecologically unfamiliar tasks.

Professor Jones summarizes the manner in which EA can explain BLE's observations: "In sum, evolutionary analysis . . . raises the hypothesis . . . that at least a significant subset of puzzlingly irrational behavior . . . are probably the result of substantively rational behavior that simply surfaces in the wrong era, facing novel environmental conditions that render once adaptive behavior maladaptive—and once rational behavior irrational."[107]

This Note extends this analysis to similarly show that the apparently irrational and unselfish behavior observed by BLE—behavior that challenges the traditional economic expectation of humans as purely self-interested actors—can be explained by EA with a discussion of the evolution of cooperation.

B. Explaining Cooperation and Fairness

Humans do a number of things that confound economists. Among them, we manage to partake in costly acts that have no visible benefit. Tipping "on the road," where the quality of repeat service is not at risk, provides the prototypical example. In an attempt to explain this type of behavior, economists invoke such principles as the notion of "psychic income."[108] This concept holds that people tip because it provides a sense of pleasure that tilts the balance of cost versus benefit on the side on benefit.[109] This, however, begs the question—why is this behavior pleasurable?[110]

Behavioral law and economics recognizes this predisposition for over-cooperativeness in other scenarios. Using a simple tool, the Ultimatum Game, BLE demonstrated that people will cooperate,

106. Parekh, *supra* note 7, at 212. Professor Jones refers to the dissonance between historically adaptive behavior and modern environments as "time-shifted rationality." Jones, *Time*, *supra* note 7, at 1172. This concept observes that "any trait resulting from the operation of evolutionary processes on brains that, while increasing the probability of behavior that was adaptive in the [EEA], leads to substantively irrational or maladaptive behavior in the present environment." *Id.*

107. Jones, *Time*, *supra* note 7, at 1186.

108. *Id.* at 1176.

109. *Id.*

110. *Id.*

even in single-shot interactions.[111] Jolls, Sunstein, and Thaler provide a brief description of this game:

> [O]ne player, the Proposer, is asked to propose an allocation of a sum of money between herself and the other player, the Responder. The Responder then has a choice. He can either accept the amount offered to him by the Proposer, leaving the rest to the Proposer, or he can reject the offer, in which case both players get nothing.[112]

Economics predicts that a Proposer will offer the lowest amount and the Responder will always accept because any gain is better than none at all.[113] In actuality, Responders routinely reject low offers and Proposers, almost anticipating this response, rarely offer less than half the total amount.[114]

How do we explain this phenomenon? Traditional economics proffers no plausible answer for unself-interested behavior. BLE attempts to rationalize this phenomenon by contending that people have a tendency for "reciprocal fairness."[115] This model holds that a fairness quotient exists in each participant's utility functions. In essence, BLE argues that "[h]uman behavior, including human choice behavior, is a complex function of many known and unknown factors. Economic variables play an important, sometimes determinative role in the equation. But so do [many others]. . . ."[116] BLE indicates that this fairness principle demonstrates that humans, contrary to the belief of law and economics, express only bounded self-interest rather than ruthless selfishness.

But while BLE's empiricism effectively challenges the self-interest presumption of law and economics, its explanation for these very important findings proves incomplete. Just as with the question begging economic notion of psychic income, BLE does not explain why one outcome seems fairer than another. EA, in contrast, parsimoniously provides an explanation for BLE's observed cooperation. EA holds that this cooperation is not a result

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111. Jolls, *supra* note 95, at 21–23. For a detailed analysis of this game see, Werner Guth et al., *An Experimental Analysis of Ultimatum Bargaining*, 3 J. ECON. BEHAV. & ORG. 367 (1982); Daniel Kahneman et al., *Fairness and the Assumptions of Economics*, 59 J. BUS. S285 (1986).

112. Jolls, *supra* note 95, at 21.

113. *Id.*

114. *Id.* at 22. *See also*, Ridley, *supra* note 39, at 139–40; Robyn M. Dawes & Richard H. Thaler, *Anomalies: Cooperation*, J. ECON. PERSP. 187 (1998).

115. Jolls, *supra* note 95, at 24.

116. Jacob Jacoby, *Is it Rational to Assume Consumer Rationality? Some Consumer Psychological Perspectives on Rational Choice Theory*, 6 ROGER WILLIAMS U. L. REV. 81, 84–85 (2000).

of psychic income or fairness quotients; it is instead the modern manifestation of our evolutionary innate predisposition to cooperate.[117]

EA notes that tendencies to cooperate, just like other economic anomalies such as inconsistent preferences[118] and the framing effect,[119] result from a brain programmed to ensure survival in the EEA. As has been shown, the brain possesses an algorithm that encourages us to cooperate both with kin and non-kin in small group settings. This particular strategy prospered because it, as compared to unabashed self-interest, provided an evolutionarily stable strategy for the survival of our genes. And, since we still possess the brain selected through evolution, this penchant for cooperation persists today.

Economist Vernon Smith reinforces the theory that cooperation in the ultimatum bargaining game, frequent in one-shot plays and perpetual in iterated games, results not from fairness but from reciprocity.[120] Smith argues that Proposers instinctively offer a more than economically rational portion of the pot because they, like the vampire bats discussed earlier, know that where they refuse to scratch another's back today, they could be refused a reciprocal back scratching tomorrow. In essence, Proposers routinely enact a Tit-for-Tat strategy. Such cooperation does not result from a general sense of fairness or justice; rather the parties are in essence instinctively trading. They are being unselfish in the hope that they can later benefit from reciprocal generosity: "Tell your children to be good, not because it is . . . superior, but because in the long run it pays."[121] Our innate affinity for cooperation developed for this reason and still phenotypically expresses itself today.

This genetic norm of reciprocity serves another function. Aside from ensuring that a favor will later be returned once a game has begun, reciprocity also determines with whom we play the game. Cooperators will be preferred partners over suspected defectors. This understanding of reciprocity demonstrates that "reciprocators

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117. *See, e.g.*, Jones, *Time*, *supra* note 7, at 1176. ("The [time-shifted rationality analysis] suggests that seemingly irrational tipping exists because of the adaptive value of reciprocal altruism . . . operative in small communities, *notwithstanding* the fact that technology has quite recently made such communities rare." (emphasis added)); Posner, *supra* note 98, at 1161–63.

118. Jones, *Time*, *supra* note 7, at 1175.

119. Rode & Wang, *supra* note 27. The framing effect demonstrates that individuals respond to dilemmas and vary their decisions based upon how choices are phrased. *See generally* Daniel Kahneman & Amos Tversy, *The Framing of Decisions and the Psychology of Choice*, 211 SCIENCE 453 (1981).

120. See the discussion of Smith in RIDLEY, *supra* note 39, at 140–41.

121. *Id.* at 141.

precipitate out of society, leaving the selfish rationalists to their fate. The virtuous are virtuous for no other reason than that it enables them to join forces with others who are virtuous, to mutual benefit."[122]

The tendency to cooperate proved rational in the EEA because it ensured survival. But note that while it suited humans well in the past, it occasionally proves inconsistent with modern life. Contrary to BLE's claims of bounded rationality and bounded self-interest, this does not mean that we are irrational actors. "Instead, it probably reflects time-shifted rationality, in which a generally adaptive predisposition is temporarily mismatched to today's evolutionarily unique conditions."[123] Whereas during the EEA we most often interacted with kin (giving rise to altruism) or individuals we likely encountered daily (giving rise to reciprocity), today "we interact a great deal with strangers. But our instincts are easily fooled when confronted with conditions to which human beings never had a chance to adapt biologically,"[124] such that we still frequently cooperate in a manner inconsistent with rational choice theory.

EA then amends the claims of economics and behavioral economics, which assert that individuals irrationally cooperate because they insist on including quasi-economic or non-economic elements into their calculations of expected utility. Rather than exhibiting irrationality:

> [T]he human mind...may often be better than rational. On evolutionarily re-current computational tasks, such as object recognition, grammar acquisition, or speech comprehension, the human mind greatly outperforms the best artificial problem-solving systems that decades of research have produced, and it solves large classes of problems that even now no human-engineered systems can solve at all.[125]

However, despite its prowess, the human mind will not purposefully generate behavior that conforms with economic rational choice. Instead, non-rational behavior can emerge given manifestations of our evolutionary proclivity for cooperation. As Posner writes:

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122. *Id.* at 147.
123. Jones, *Time*, *supra* note 7, at 1177.
124. Posner, *supra* note 98, at 1561.
125. Cosmides & Tooby, *supra* note 25, at 329.

> Voting, giving to charities, and refraining from littering, in circumstances in which there is neither visible reward for these cooperative behaviors nor visible sanctions for defection, may illustrate an instinctual, and as it were biologically mistaken, generalization of cooperation from small-group interactions, in which altruism is rewarded (hence reciprocal) and failures to reciprocate punished, to large-group interactions in which the prospects of reward and punishment are so slight that cooperation ceases to be rational.[126]

Not only does this explain BLE's observations, but also helps us understand why this instinct of cooperation that exists in iterated interactions among either kin or small groups does not prevail in modern settings. It shows why, for example, the instinct to cooperate does not prevent terrorism or preclude wars.

In sum, humans are often generous and unselfish because this tendency was hard-wired into the brain by the engine of natural selection. Accordingly, commonly observed irrationalities will result when the brain attempts to negotiate dilemmas that did not exist in the EEA. Given this comprehension, theorists can predict seemingly irrational behavior. These predictions can then be verified by BLE's empirical studies. Combining the motivational theory proposed by EA and the findings outlined by BLE, moves the discipline from a catalogue of observations to a predictive device that can enable us to enact effective legal rules prospectively.

C. Reforming Legal Regulations

Aside from theorizing behavioral law and economics, evolutionary analysis and the law can also suggest whether current laws are adequate and how to best amend faulty rules. This project is no different from the goal of law and economics, but instead of relying on economic axioms, EA grounds its examination on evolutionary insights to human behavior.

One area to apply EA is the regulation of transactions, both between individuals and between institutions. This is particularly true given the implications of an evolved predisposition towards cooperation. In its most cerebral form, a consideration of innate cooperation challenges the need for legal regimes to govern exchanges in the first place. As Cosmides and Tooby report:

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126. Posner, *supra* note 98, at 1562.

> Instead of the traditional view that selfishness is 'natural' and altruism is only imposed socially against natural inclination, evolutionary biology has discovered that altruism and cooperation can be as natural as selfishness. In fact, these analyses have shown that Hobbes was quite wrong: Cooperation can emerge in the absence of a Leviathan, and adaptations for the expression and regulation of cooperation and altruism are expected design features of social organisms.[127]

Social interaction existed long before laws, and systems of trade whereby actors conduct exchanges of mutual benefits have "been part of the human condition for at least as long as *Homo sapiens* has been a species."[128] In light of this, perhaps EA should recommend a general scheme of *laissez faire* that simply relies on natural cooperation to provide order in our daily lives.

A careful application of EA, however, does not counsel this suggestion. The cooperation selected for during hominid evolution serves humans only in particular environs; it helps in interacting with kin and in repeat contact with non-kin. Modern commerce, however, involves much broader interactions. It routinely entails exchanges between unequal parties—for instance the lone purchaser against retail giants. Contemporary trade over the internet occurs between parties who often never meet once, let alone multiple times. And exchanges today travel on more of a one-way street than, say, the interactions between vampire bats. We frequently buy from retail outfits, but these sellers rarely look to us for an equivalent purchase at a later date. Our cooperative systems of altruism and reciprocity simply did not evolve to face these relations.

Increased group size catalyzed the environmental divergence between the EEA and today. Throughout the course of evolutionary development, humans lived in societies of fewer than one hundred people.[129] Over time, as population grew, human group size increased. This inflated group size stressed individual survival because, with a larger number of transactors, reciprocity proved a less beneficial strategy. The innate tendency to cooperate, developed in an environment of a few individuals whom we could recall and transact with repeatedly, was less effective in this social setting. As anthropologist Polly Wiessner describes:

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127. Cosmides & Tooby, *supra* note 31, at 161.

128. Ridley, *supra* note 39, at 200.

129. Janet L. Landa & Xiao-Tian Wang, *Bounded Rationality of Economic Man: Decision Making under Ecological, Social, and Institutional Constraints*, 3 J. BIOECONOMICS 217, 221 (2001).

> Throughout the course of history, with increasing population, inter-group competition and new techniques for harnessing energy and storing wealth, humans formed ever larger and more complex social groups. Membership in larger social groups confers many benefits, but the greater anonymity of such groups introduces ever more risk into transactions.[130]

This novel environment demanded newer strategies to ensure survival.

However, increasing group size did not purge humans of the cooperative tendency. First, evolution during the EEA permanently wired human brains with a predilection for altruism and reciprocity. Second, humans still rely on strategic cooperation in small-group interactions. As X.T. Wang notes, "size is a powerful and parsimonious contextual cue for activating specific mechanisms that have been designed to solve important problems posed by human small-group living."[131] In light of this, cooperation emerges. Where group size is limited, the evolutionary stable strategy of cooperation kicks in.

This shows that EA does not recommend abandoning external regulation of social interactions, namely trade. At the same time, however, EA advises that because cooperation will still emerge in small-groups settings, regulatory rules should be tailored to the appropriate context. Different, if not less, intervention is required to govern small-group interactions.

The laws pertaining to close corporations provide a good example of this dissonance between large and small-group regulation.[132] In monitoring these entities, the law, though providing a set of alternative statutes for close corporations, largely draws from the rules that regulate publicly held corporations.[133] These conventions for public corporations attempt to discourage opportunistic behavior through the use of onerous legal and market incentives.[134] Via a system of required contractual agreements and expected duties (such as the fiduciary duty and the business-judgment rule), the law endeavors to encourage cooperation between shareholders, officers, and employees of large entities. Whether these attempts succeed is not a question for this Note, but it seems unlikely that

130. Wissener, *supra* note 61, at 37.

131. X.T. Wang, *Kith and Kin Rationality in Risky Choice: Theoretical Modeling and Cross-Cultural Empirical Testing, in* RISKY TRANSACTIONS 51 (Frank K. Salter ed., 2002).

132. Margaret M. Blair & Lynn A. Stout, *Trust, Trustworthiness, and the Behavioral Foundations of Corporate Law*, 149 U. PA. L. REV. 1735, 1800–08 (2001).

133. *See* 18A AM. JUR. 2D *Corporations* § 747 (2003).

134. Blair & Stout, *supra* note 132, 1735.

relying solely on evolved human behavior will effectively control these monstrous institutions. As a result, market incentives and legal regulations should be preferred.

At the same time, such extensive oversight may not be necessary for close corporations. Self-selected groups of people who trust one another most often form these entities.[135] Given the small number of actors in such scenarios, pre-existing notions of trust and reputation, the frequent interaction of members, and the constant opportunity to punish those who do not cooperate, reciprocity norms themselves can adequately ensure cooperation in close corporations while discouraging opportunism. As a result, it would be possible to do without cumbersome legal regulation. At the very least, the law should acknowledge that incentives aimed at encouraging cooperation in large-group settings will either be unnecessary or ineffective in the small-group environment.

Margaret Blair and Lynn Stout's study advocates such an understanding and humility in our regulation of institutions. They write:

> The case of the closely held corporation illustrates how business relationships characterized by a high degree of mutual vulnerability can survive and thrive even when legal and market forces are largely absent or impotent. As importantly, it suggests how attempts to discourage opportunism by appealing to the law can sometimes backfire and lead to an *increase* in misbehavior.[136]

This discussion demonstrates that recognizing the evolved predisposition to cooperate, along with understanding that this tendency will express itself in particular environments, can help assess the effectiveness and propriety of legal rules. It is a prime example of how EA can effectively influence the law.

EA, through the evolution of cooperation, can add more insight into the governance of trade and exchange. First, knowledge of the innate tendency to cooperate can ensure that legal rules account for the realities of human behavior. Applying such knowledge, as will be shown, can help ensure that laws impose limited private and social costs. Second, systems of biological cooperation—i.e. reciprocity—can provide functional examples of efficient business models. As reciprocity prevailed in the daunting environment of

135. *Id.* at 1802–04.
136. *Id.* at 1805.

evolution, perhaps institutions of exchange governed by this strategy can excel equally well today.[137]

D. Reducing the Costs of Evolutionarily Insensitive Rules

Legal rules that ignore human realities will prove inefficient. Imagine a legislature working under the false assumption that all Americans speak fluent Latin; relying on this impression, they require that contractual agreements be drafted in that language. This, no doubt, would cause innumerable problems. If people adhered to such a law, their activities would prove more costly because, instead of simply conducting business in English, they would be forced to either learn a new language or spend valuable resources translating contracts to and from Latin. Even if the law permitted negotiation around the rule, the commensurate transaction costs endemic to negotiation would drive up the price of contractual relationships. Either way, a rule that is insensitive to human behavior raises the costs of mutual agreements.[138]

Professor Thomas Smith uses this recognition to explain the roots of partnership law.[139] Since the *Institutes of Justinian*, the law of partnership dictated the default rule that partners should divide their profits equally.[140] Smith argues that this rule persists because it is intuitive: it is the rule laymen would themselves have selected, in the absence of law. Using Nash bargaining principles and later evolutionary theory, he notes that a preference for equal sharing naturally reflects our evolutionary tendency to cooperate. Smith writes:

> Relatively simple, default rule partnerships are similar to the small, nomadic bands in the EEA in which egalitarian sharing and decision making probably prevailed. It may be that as small, cooperative and productive groups, default rule part-

137. Robert Axelrod's famous book, THE EVOLUTION OF COOPERATION, *supra* note 38, relies on this assumption to suggest reciprocity be used as a model for transnational relationships and resolving intra-governmental agency conflicts.

138. This can be applied to our discussion of the close corporation. When the law attempts to place restrictions on close corporations, where reciprocity alone would have provided stability, these regulations impose extra costs on the entity. Further, those participants who realized this *ex ante*, likely regressed to their evolutionary tendency to cooperate and contracted around the legal regulations. This itself would waste valuable resources due to transaction costs. A rule that precluded all of this would prove most efficient.

139. Thomas A. Smith, *Equality, Evolution and Partnership Law*, 3 J. BIOECONOMICS 99 (2001).

140. *Id.*

> nerships invoke psychological predispositions that evolved in humans during the EEA to coordinate production and distribution of food. These predispositions tend to be egalitarian with respect to sharing and governance. Their existence may make egalitarian default rules more efficient than would be inegalitarian rules in this particular setting of small group production.[141]

In essence, Smith notes that an equal sharing rule reflects our natural tendency to cooperate. Because this default is sensitive to the truths of human behavior, it results in model efficiency. Again, where a rule conforms with human behavior, individuals can articulate through the law their genetic predisposition to cooperate. When the law diverges with innate cognitive mechanisms, natural tendencies will induce actors to negotiate around the rule and agree on an alternative that permits expression of their expected behavior. This supplemental contracting, however, drains resources. Accordingly, EA directs that where appropriate, a default rule should conform to instinctive behavior and reduce private and social costs.

This claim does not advocate that all legal rules should automatically consider evolutionary developed human behavior in their mandates. Often, evolutionary predispositions diverge from modern conceptions of right and wrong. Take, for example, stereotyping.[142] Humans have a natural tendency to categorize objects, including human beings. This process of categorization requires visual recognition cued by particular memorized characteristics. But while categorization helps people distinguish between a rock and a car, by negotiating a mental checklist of characteristics, it also results in the stereotyping of individuals. Humans use visual clues and characteristics to differentiate between people as well as objects. This, unfortunately, leads humans to use visual and physical characteristics, such as race, age, and gender, to discover one's identity. But the law should not encourage stereotyping simply because evolution created a brain that functions in this manner. Only where the behavior created by natural selection conforms with societal norms should the law create a default rule that responds to evolutionary tendencies. Since, for example, equal sharing appeals to modern sensibilities, it is an appropriate candidate for a default rule.

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141. *Id.* at 118.

142. Parekh, *supra* note 7, at 240–45.

E. Cooperation as a Model of Efficient Business Structuring

The fact that cooperation prevailed as a strategy during the course of evolution says something about its efficiency; cooperation successfully regulated human interaction for thousands of years. In part because of rampant cooperation and small-group size, there was no need for a central Leviathan[143] during the early periods of human existence.

But, as noted, group size changed all of this. When size ballooned, new methods of controlling social interactions developed. At first these schemes were extra-legal:[144] a prime example of this is merchant self-regulation.[145] In the 11th century merchants began to regularly travel beyond their home districts to trade. But with transactions in distant lands came fear that no foreign sovereign would enforce an alien merchant's rights: a breach of contract, the worry was, would have no remedy. In response merchants developed their own regulatory regime, that of the *lex mercatoria.*

When governments eventually took a hands-on approach to commercial regulation, the results were frequently disastrous.[146] This failure stemmed partly from an inability to realize the nature of human interaction. Elinor Ostrom provides an example of this:

> The "tragedy of the commons" is based on the assumption that rational individuals are helplessly trapped in social dilemmas from which they cannot extract themselves without inducement or sanctions applied from the outside. Many policies based on this assumption have been subject to major failure and have exacerbated the very problems they were intended to ameliorate.[147]

Global attempts at nationalization prove illustrative of this failure.[148] The demise of the Green Revolution and the economic crumble of the old Soviet bloc provide additional historical proof.

In light of the fiasco of public over-regulation and the success of reciprocity during evolution, EA suggests that perhaps regimes of control should center on the principles of evolutionary coopera-

143. *See generally* THOMAS HOBBES, LEVIATHAN (M. Oakeshott ed. 1957)(1651).
144. Ridley, *supra* note 39, at 202.
145. *See id.* at 202–04.
146. *Id.*
147. Ostrom, *supra* note 65, at 3.
148. Ridley, *supra* note 39, at 236.

tion.[149] To achieve this end, systems of trade and business need to recreate the type of environment in which cooperation prevails—namely, situations where reputation information is readily available either in fact or through signals that approximate trustworthiness.

Before describing where this approach has already succeeded, it is necessary to briefly discuss the naturalistic fallacy. This logical error argues that the products of evolution are ideal. It argues that because the engine of natural selection created certain behaviors, these are proper and moral. The fallacy rests in deducing an "ought" from an "is."[150]

But the naturalistic fallacy fails to recognize that evolution comes attached with no normative valuation. This was the central flaw of Social Darwinism. Accordingly, simply because some innate human tendencies may lead people to commit crimes does not mean that these crimes should be excused. Similarly, we should not endorse cooperation or reciprocity as models of regulation because they are products of evolution. Rather, we should condone and encourage evolutionary tendencies only when they conform to societal norms.

Additionally, simply because cooperation was an evolutionary stable tactic that prospered does not mean that it is the most successful of all strategies. Rather, it was one of many possible techniques that randomly emerged during evolution and persisted, not because it was the best possible method, but because it was superior to the alternatives. Just as human bodies are imperfect because genes did not require flawlessness to perpetuate, so too is cooperation not necessarily ideal. We should therefore not opt for cooperation-centric regimes merely because altruism and reciprocity emerged unscathed from evolution. Rather we should do so because cooperation is intuitively a better strategy that its alternatives. That said, evolutionary analysis, through its elucidation of the successful strategy of cooperation, can aid the law. Cooperation, an effective though imperfect tactic in the EEA, might help improve modern institutional relationships—particularly those of trade.

Substantial work in demonstrating this has already been done, though not officially under the umbrella of EA studies. Two examples spring from the scholarship of Lisa Bernstein[151] and Janet

149. *See, e.g.*, Ostrom, *supra* note 65, at 3.

150. The naturalistic fallacy was first termed so by G.E. Moore in PRINCIPIA ETHICA (1903).

151. Lisa Bernstein, *Private Commercial Law in the Cotton Industry: Creating Cooperation Through Rules, Norms, and Institutions*, 99 MICH. L. REV. 1724 (2001).

Landa.[152] Both demonstrate how, absent extensive legal regulation, cooperation can develop in systems of exchange by fashioning trading environments that recreate the conditions in which cooperation prospered — namely small-group settings (or larger ones that still provide a similar amount of information on reputation as in smaller environments) and the ability to avoid and punish cheaters. Modern extra-legal networks, such as those controlling the American cotton trade and Chinese rubber exchange, do just that by creating reputation-governed regimes that effectively remove contract arrangements and disputes from state regulation.

1. Cooperation and the Cotton Trade—The sale of cotton, unlike most commodities, is not governed by the Uniform Commercial Code but by the rules of the Liverpool Cotton Association—a private legal system with its own rules and arbiters.[153] To a large extent, this association has few absolute rules on contracting and trade; those it does have are bright-line ones that avoid the heavy legal analysis required of laws employing terms like "reasonable."[154] But by and large, the association manages to exert control by fostering cooperation and trust between trading partners through a reputation-based regime.

Reputation plays a central role to these traders. As one participant reports, "[reputation] is essential in this business [because] [m]illions of dollars of business will be done on the basis of a thirty-second phone call."[155] Accordingly the private legal regime created a system that freely exchanges reputation information, both through institutional clearinghouses and social interactions. Cotton institutions, for instance, "created formal methods of transmitting reputation information, such as circulars reporting the names of transactors who refuse to arbitrate or to comply with an award rendered against them, and, in some associations, information bureaus."[156] The industry also forces social bonds between its members: spouses and children of traders are encouraged to get together, merchants hunt with one another, and the association sponsors regular social events.[157] But these social networks serve more than an entertainment function. In binding these traders

152. Landa & Wang, *supra* note 129, at 227–31; JANET T. LANDA, TRUST, ETHNICITY, AND IDENTITY: BEYOND THE NEW INSTITUTIONAL ECONOMICS FOR ETHNIC TRADING NETWORKS, CONTRACT LAW, AND GIFT-EXCHANGE (1995); Janet. T. Landa, *A Theory of the Ethnically Homogenous Middleman Group: An Institutional Alternative to Contract Law*, 10 J. LEGAL STUDIES 349 (1981).

153. Bernstein, *supra* note 151, at 1724–25.

154. *Id.* at 1732.

155. *Id.* at 1746.

156. *Id.* at 1752.

157. *Id.* at 1750–52.

into small, interconnected groups, the industry facilitates gossip that transmits reputation information. "These networks are so effective that most transactors know of each other or can call someone that is in the region to verify some information on a person/firm they are considering doing business with."[158] Those with poor reputations—those known to deliver low-quality goods, to perform or pay late, or to fail to renegotiate commitments—are ostracized. In essence, these defectors are screened out for their inability (or predicted inability) to cooperate.

This regulatory scheme greatly outperforms traditional legal regulation of contracts. Unfair dealings are rare. When third party resolution of disputes is necessary, arbitration is expeditious and inexpensive. "In short, the industry has succeeded in creating and maintaining a private legal system in which transactions costs, error costs, legal system costs, and collection costs are low."[159]

2. Cooperation and Chinese Rubber Traders in Southeast Asia—Just like the exchange of cotton, the rubber trade in Southeast Asia proves a high risk transaction. Money is advanced without security and contracts are rarely formal.[160] Accordingly, for businesses to succeed, traders must possess a high degree of trust in one another. But how do they ensure they are interacting with trustworthy parties given the number of potential transactors? Traders routinely rely on the Confucian "calculus of relations" when selecting whom to deal with.[161] To summarize, this system directs individuals to trade with those highest up on a hierarchy of potential trading partners.[162] At the top (i.e. the preferred partners) are kin and family. Further down the list area various groups with increasingly distant connections to the trader; the list moves from kin to clansmen and non-relations who speak the same dialect to non-Chinese traders.[163]

"In order to economize on contract enforcement costs, a rational trader will choose his network of trading partners from the inner most circle, before moving outwards. . . . "[164] In the absence of reputation information, such as those provided in the cotton trade, relationships that ensure subsequent contact provide incentives for cooperation. We saw this with biological systems of

158. *Id.* at 1752 (internal quotation marks omitted).
159. *Id.* at 1725.
160. Landa & Wang, *supra* note 129, at 227.
161. *Id.* at 228.
162. *Id.*
163. *Id.*
164. *Id.*

reciprocity. Whereas the cotton trade provides reputation information *ex post*, the Confusion cultural norms anticipates reputation *ex ante*. "For Chinese merchants the Confucian code of ethics thus serves . . . as a *cognitive screening and signaling device* for efficiently obtaining information to predict or infer about the degree of trustworthiness of a potential trading partner."[165] And to amend any errors in these predictions, when a trader deals with a defector from any level of relatedness, that cheater is ostracized from the trading regime.[166] "In this way [this order] functions as a low-cost club-like organization, alternative to contract law, which economizes on costs of contract enforcement. . . ."[167]

F. Evaluating the Success of these Markets

In both the cotton and rubber regimes, trading groups that foster cooperation through reputation-based systems prosper. From an EA perspective, they succeed for two reasons. First, given that they involve tight-knit groups, the systems mirror the environment of the EEA. Accordingly, the traders' brains, with their evolutionary programming, have the tools to solve any social problems that arise. Unlike vast and impersonal systems of commerce, these specialized trade groups involve the type of constant interaction and the opportunities to punish defection that existed in the EEA. In constructing an ecologically familiar environment, the regimes properly take into account, and benefit from, human behavior. As discussed above in the context of partnership law, this responsible approach reduces private and social costs.

Second, these regimes prosper because they effectively utilize a successful method of dealing with social dilemmas: reciprocity. Just as humans relied on cooperation to survive in the EA, "[a]s human beings began . . . to engage in agriculture and long-distance trade, forms of reciprocity with individuals other than close kin were essential to achieve mutual protection, to gain the benefits of long-distance trading, and to build common facilities and preserve common-pool resources."[168] Building on this success, this Note and EA direct that those market structures that encourage reciprocity follow in the tradition of evolutionary cooperation and prosper.

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165. *Id.* at 229.
166. *Id.* at 228.
167. *Id.*
168. Ostrom, *supra* note 65, at 2.

These systems can create an incentive for cooperation purely by ensuring access to accurate reputational information. Since, unlike vampire bats or humans in pre-historic communities, one member cannot test the willingness of potential partners to cooperate, private legal rules can guarantee that defectors are identified and weeded out. Through the tools of reputation and the punishment of ostracism, opportunistic behavior can be curbed and cooperative interaction fostered.

Again, reputational information is necessary because it facilitates cooperation in interactions where repeat "games" and first-hand knowledge cannot be guaranteed. As Elizabeth Hoffman, et al., note:

> If humans are preprogrammed to learn to achieve cooperative outcomes in social exchange, then factors that facilitate the operation of these natural mechanisms should increase cooperation even in the presence of contrary individual incentives. For example, cooperation should increase if individuals can observe and monitor one anothers' behaviors even if there are no direct mechanisms for enforcing specific behaviors.[169]

Specifically, reputation information enables market actors to effectively embrace "Tit-for-Tat" strategies to encourage competition.

This is particularly obvious in Bernstein's discussion of the cotton trade. Her own words best demonstrate this:

> [I]n order for cooperation to emerge in a particular market, transactors must each adopt strategies of cooperating at the beginning of each contracting relationship and thereafter responding to cooperative behavior with cooperation and responding to uncooperative behaviors (defection) with punishment (such strategies are called 'tit for tat' strategies). Each transactor must also be able to obtain information about the reputations of other market participants, and reputation must be at least partially dependent on how a transactor behaved in previous transactions. In addition, each transactor must be able to observe whether the person he is dealing with has cooperated or defected. . . . Because noncooperative responses tend to reduce his future trading opportunities, the long-run cost of defection will often be greater than the

169. Hoffman et al, *supra* note 86, at 339.

> short-term gain from defection, so a transactor who is not in financial distress is more likely to cooperate than to defect.[170]

With reputational information, trade regimes can facilitate cooperation among their members. This cooperation, in turn, results in efficient ordering by reducing the costs of operation. This reality suggests that following the evolutionary model of reciprocity in today's business world can lead to success.

Landa repeats that this effective market ordering need not require a sophisticated private legal regime. As with Chinese rubber traders, ecologically rational clues of reputation, including kinship and the probability of recurrent interaction, predict who will be optimal trading partners. This information can be obtained cheaply and requires no formal mechanism of conveying reputation.[171] Simply by relying on this evolutionarily sensible proxy for reputation, these traders, "by economizing on contract-enforcement and information costs, can *out-compete* other ethnic groups. . . ."[172] In molding economic relations around reciprocity norms, we can create *pareto* optimal regimes without the involvement of governments and public law at large.

G. Concluding Part III—Implications

Part III showed how EA can be applied practically to the law. It examined what changes could result from an understanding of cooperation as an innate mechanism which developed during the EEA and persists today in small-group contexts. The list is surely not exhaustive: not only can EA and the evolution of cooperation provide other insights, but the numerous other concepts that emerge from evolutionary studies can and will add even more. The scholarship is in its infancy, but the coming years are sure to see further discoveries of the evolutionary roots of behavior as well as the implications these findings have for the law.

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170. Bernstein, *supra* note 151, at 1763–64.
171. Landa & Wang, *supra* note 129, at 231.
172. *Id.* at 230.

PART IV: CONCLUSION

Despite the value of EA studies demonstrated by this and other scholarship, a number of theorists question its importance.[173] They challenge EA by questioning the ability of evolutionary science to ever discover the roots of human behavior. For example, scientists do not know enough about the EEA on which so much of evolutionary analysis rests,[174] and the pace of human evolution is so remarkable that behavior cannot be deciphered by a purely evolutionary approach.[175] Critics further note that, even if assessments of the EEA are correct and scientists know which behaviors natural selection propagated, the pressures of cultural evolution have transformed these behaviors completely.[176]

Additionally, critics note it is difficult to evaluate the accuracy of evolutionary studies. Robert Wright observes that:

> [t]esting theories, of course, is a general problem for evolutionary biologists. Chemists and physicists test a theory with carefully controlled experiments that either works as predicted, corroborating the theory, or don't. Sometimes evolutionary biologists can do that .... But biologists can't

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173. For a review of these, see Parekh, *supra* note 7, at 229–31. These criticisms can be found in sources relating solely to evolutionary biology and those directly attacking EA. Examples can be found in the following pieces: Jeffrey J. Rachlinski, Comment, *Is Evolutionary Analysis of Law Science or Storytelling?*, 41 JURIMETRICS J. 365 (2001); Russell Korobkin, *A Multi-Disciplinary Approach to Legal Scholarship: Economics, Behavioral Economics, and Evolutionary Psychology*, 41 JURIMETRICS J. 319, 328 (2001); Paul Rozin, *Evolution and Adaptation in the Understanding of Behavior, Culture, and the Mind*, 43 AM. BEHAV. SCIENTIST 970 (2000); Richard C. Lewontin, *The Evolution of Cognition: Questions We Will Never Answer*, *in* 4 AN INVITATION TO COGNITIVE SCIENCES: METHODS, MODELS, AND CONCEPTUAL ISSUES 107, 108 (Don Scarborough & Saul Sternberg eds., 1998); Steven J. Gould, *Sociobiology: The Art of Storytelling*, *in* NEW SCIENTIST (1978).

174. Rachlinski, *supra* note 173, at 366–67.

175. Ridley & Dawkins, *supra* note 59, at 31–32.

> [W]e have to admit that Homo sapiens really is a rather unique species. It has transformed the environment at a greater rate, if not a greater extent, than the plants of the Precambrian which put the oxygen into the atmosphere, or than the corals which built reefs visible from the moon. It is a species whose main mode of evolution is now nongenetic and whose behavior it will be impossible to understand only by an evolutionary genetic approach. The evolutionary uniqueness of man is that he is uniquely inscrutable to biologists interested in adaptation.

Id.

176. *See, e.g.*, Rozin, *supra* note 173, at 976.

> experiment with human beings . . . and they can't conduct the ultimate experiments: rewind the tape and replay evolution.[177]

Given these uncertainties, the critics argue that EA—or any evolutionary study for that matter—is, in the words of Stephen Jay Gould, "just-so stories."[178] They argue that EA offers neither the precision of mathematics or physics nor the parsimony of theories such as economics.

Though at first glance these criticisms seem tenable, a detailed analysis shows they do not comprehend the true nature of attempts to explain and theorize.[179] Among other things, these critiques ignore that unproven scientific explanations have routinely, throughout the history of science and thought, demonstrated their intrinsic value.[180] For example, Newton's laws of gravity and Einstein's theory of relativity could not be proven under the rubric of science until years after their formulation. To discard evolutionary studies, including EA, at such an early stage discounts the fact that proof and tools of verification can develop after-the-fact.[181] And the complaints that EA embodies just-so stories can be resolved if evolutionary projects employ a responsible and exacting method of analysis.[182]

In the end, this Note and EA claim that "[t]he knowledge of human nature is of all human knowledge the most curious and most important."[183] EA also understands that this knowledge must be attained with the tools of evolutionary science since it is evolution that formed the brain, the situs of human behavior. In converging scientific studies of human behavior with the law, EA attempts to supplement existing theories of law, such as law and economics, where they fail. This Note has shown how an understanding of the evolution of cooperation can do just that.

But EA also recognizes that, throughout history, "in no branch of knowledge have greater errors, and even absurdities insinuated themselves, than in the philosophy of the mind."[184] Accordingly, EA hopes to conduct this fusion between law and evolution responsibly. Among other things, it must simultaneously encourage laws

177. WRIGHT, *supra* note 6, at 193–94.

178. Stephen J. Gould, *Sociobiology and Human Nature*, *in* SOCIOBIOLOGY EXAMINED 288 (Ashley Montagu ed., 1980).

179. This response was first stated in Parekh, *supra* note 7, at 231–34.

180. *Id.*

181. *See generally* RIDLEY, *supra* note 18, at 106.

182. One such method has been outlined by Steven Pinker. PINKER, *supra* note 21, at 38.

183. WILSON, *supra* note, at 206.

184. *Id.* at 208.

that foster behaviors in keeping with our social norms, and be willing to work against evolutionary tendencies that today strike us as immoral and unjust. All the while, EA should continue to avoid the temptations of the naturalistic fallacy: under no circumstances do evolutionary scientists contend that the laws and products of evolution are ones that we should blindly champion today simply because they come from evolution.

When the project of EA is conducted in a conscientious manner, evolutionary analysis can improve our legal regime. This Note demonstrated that a cognizance of the roots of human cooperation can benefit the law by theorizing BLE's findings, by ensuring our rules result in the fewest and lowest costs, and by providing models for successful socio-economic interactions. In doing so, this Note hopes to have demonstrated the value and promise of evolutionary analysis and the law.