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BOOK REVIEW

The Evolutionary Path of the Law

Review of Ullica Segerstråle, Nature's Oracle: The Life and Work of W. D. Hamilton (2013)

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There is a lot to be said for everyone [in science] doing their own advocacy. Very possibly the truth comes out faster that way—the courts, at least, seem to think so.

W. D. "Bill" Hamilton[1]

I. INTRODUCTION

Among other things, Ullica Segerstråle's biography of W. D. "Bill" Hamilton recounts the quiet and lonely steps leading up to Hamilton's

1. Ullica Segerstråle, Nature's Oracle: The Life and Work of W.D. Hamilton 321 (2013) (quoting W.D. Hamilton, Narrow Roads of Gene Land 414 (2002)).

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revolutionary formulation of the "gene's-eye" view of evolution in nature.[2] With his gene's-eye view of natural selection, or evolution as a change in frequency over time, Bill Hamilton—along with a small band of Anglo-American evolutionary theorists, including such lights as George Price, John Maynard Smith, Robert Trivers, and George Williams—transformed the theoretical foundations of Darwin's theories of natural and sexual selection and changed forever our understanding of nature.[3]

But what legal lessons, if any, can legal scholars learn from the life and work of this great scientist, a lifelong student of nature and one of the founding fathers of the controversial field of "sociobiology"?

Three aspects of Bill Hamilton's work in evolutionary biology stand out, as recounted in Segerstråle's biography: (*i*) Hamilton's elegant model of social behavior in terms of costs and benefits; (*ii*) his fruitful collaboration with the political theorist Robert Axelrod and their unexpected yet simple solution to the prisoner's dilemma, a puzzle that had defied solution until Hamilton and Axelrod came along; and (*iii*) Hamilton's conception of science generally—and in particular his view of the process of scientific justification—as a form of trial advocacy. This review of Segerstråle's biography of Bill Hamilton shall briefly recount and discuss each one of these contributions in turn.

II. Hamilton's Simple Model of Social Behavior

To begin with, Bill Hamilton's most significant, and perhaps most underappreciated, contribution to law and legal theory was his simple model of social behavior, which he quietly developed in his seminal paper

2. *See id.*
3. For a small sample of their revolutionary work in evolutionary biology, *see* W. D. Hamilton, *The Genetical Evolution of Social Behavior* (pts. 1 & 2), 7 J. Theoretical Biology, 1, 17 (1964); George R. Price, *Selection and Covariance*, 227 Nature, 520-521 (1970); John Maynard Smith, Evolution and the Theory of Games (1982); Robert L. Trivers, *The Evolution of Reciprocal Altruism*, 46 Q. Rev. Biology 35-57 (1971); and George C. Williams, Adaptation and Natural Selection (1966). The work of these evolutionary theorists was later popularized by Richard Dawkins in his classic book The Selfish Gene (1989). For an excellent biography of George Price, *see* Oren Harman, The Price of Altruism: George Price and the Search for the Origins of Kindness (2011).

"The Genetical Evolution of Social Behaviour."[4]

Hamilton's model of social behavior is simple because it looks only at the external effects (or costs and benefits) of a person's actions, or in the words of Hamilton's biographer, Ullica Segerstråle, "Altruism in Bill Hamilton's model world is purely behavioral. It involves the consequences of an action, not its motivation."[5]

In summary, Hamilton's model identifies four types of social behaviors, depending on whether an actor A is inflicting a harm or conferring a benefit on another actor B.[6] Specifically, Segerstråle summarizes Hamilton's approach to social behavior as follows: "Behavior causing benefit to self and harm to others is called *selfish*, behavior causing harm to self and benefit to others is called *altruistic*, behavior causing benefit both to self and others is called *cooperation*. Behavior causing harm both to self and others Hamilton originally called 'stupid' in his manuscript, but later identified as '*spite*'."[7] Thus, depending on the distribution of the costs and benefits of an actor's behavior, four types of human behavior are possible:

Pure Altruism. Altruistic behavior occurs when A is willing to incur a cost to confer a benefit on someone else, B, the recipient. The cost of altruistic behavior is thus internalized on the altruistic actor, while the benefit from such behavior is externalized to the recipient. In plain English, altruism is when "I sacrifice something to help you" (e.g. charity).

Pure Selfishness. Selfish behavior, in contrast, occurs when A benefits himself by imposing a cost on another, B.[8] In other words, the cost of

4. Hamilton, *supra* note 3.
5. Segerstråle, *supra* note 1, at 66.
6. *See, e.g.*, 2 W.D. Hamilton, Narrow Roads of Gene Land 44 (2002). *See also* Stuart A. West, et al., *Social Semantics: Altruism, Cooperation, Mutualism, Strong Reciprocity and Group Selection*, 20 J. Evolutionary Biology, Table 1, 418 (2006); Andy Gardner, et al., *The Relation between Multilocus Population Genetics and Social Evolution Theory*, 162 Am. Naturalist, Table 2, 214 (2007). *See generally* Robert L. Trivers, Social Evolution (1985).
7. Segerstråle, *supra* note 1, at 65-66 (emphasis added). For his part, Richard Dawkins borrows Hamilton's simple taxonomy of social behavior in the opening pages of his classic book explaining the gene's view of evolution, *The Selfish Gene*: "An entity…is said to be altruistic if it behaves in such a way as to increase another such entity's welfare at the expense of its own. Selfish behavior has exactly the opposite effect." Dawkins, *supra* note 3, at 4.
8. Notice that I refer to this form of behavior as "pure selfishness" in order to emphasize that all the costs of the actor's behavior is externalized and to distinguish this

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purely selfish behavior is externalized to the recipient, while the benefit is internalized on the selfish actor.[9] In plain words, pure selfishness is when "I inflict a cost on you to help myself" (e.g. theft).

Cooperation or "Reciprocal Altruism." Unlike behaviors I and II (altruism and pure selfishness), cooperative behavior occurs when both the actor, A, and the other, B, share the costs and benefits of their respective actions. In this scenario, some fraction or proportion of the costs and benefits of cooperative behavior are internalized on the cooperative actor, and likewise, the remaining proportion of costs and benefits are externalized to the recipient.[10] Cooperation may thus be summed up as follows: "I help myself by helping you" (e.g., trade or voluntary exchange).[11]

Spite. Lastly, spiteful behavior occurs when the actor under observation, A, is willing to pay a cost in order to impose a cost on the recipient, B; in other words, "I harm myself in order to inflict a cost or harm on you." Spiteful behavior thus produces no benefits, only costs, and these costs are both internalized on the spiteful actor and externalized to the recipient.

Before proceeding, it's worth taking moment to appreciate the elegance and potential universality of Hamilton's simple model and its relevance to

behavior from "enlightened self-interest" or cooperation (*see* section III below).

9. Recall that, in the case of altruism, it is the other way around: it is the recipient who benefits at the expense of the altruist.

10. *See, e.g.*, Trivers, *supra* note 3, at 45-47.

11. For additional examples of cooperation, *see* Robert Axelrod, The Evolution of Cooperation 73-87 (1984) (trench warfare), and Trivers, *supra* note 3, at 43-45 (warning cries in birds). As an aside, some scholars tend to (incorrectly) conflate cooperation with altruism. *See, e.g.*, Martin A. Nowak & Roger Highfield, SuperCooperators: Altruism, Evolution, and Why We Need Each Other to Succeed 59, 223 (2011) (defining cooperation as "paying a cost for the other person to receive a benefit"). This view of cooperation, however, is based on a gross conceptual error. In the case of altruism, costs and benefits are not shared: costs are internalized by the altruistic actor, while benefits are externalized to the recipient. A cooperative actor, by contrast, shares both the costs and benefits of his cooperative actions with the recipient. One possible source of this common error may be the tendency to confuse "pure altruism," in which the altruistic actor truly acts with disinterest and unselfishly, with real-life or day-to-day altruism, in which the altruistic actor actually benefits by acting altruistically (for example, by developing a reputation for altruism or by receiving favors in return for his or her altruism).

law and legal theory.[12] Simply stated, Hamilton's model of social behavior offers a clear criterion for evaluating the effectiveness and normative value of law depending on whether a given law or legal institution reduces the incidence of behaviors II (Pure Selfishness) and IV (Spite), and promotes the incidence of behaviors I (Altruism) and III (Cooperation).

III. COOPERATION WITHOUT KINSHIP; COOPERATION WITHOUT LAW?

Of the 78 possible strategic games in two-person game theory,[13] one game in particular has acquired the most attention … and the most notoriety. The so-called "prisoner's dilemma"[14] is the most famous formal model of conflict and cooperation in the mathematical theory of games.[15] It has also been described as a "compelling drama,"[16] as "the most famous

12. On the beauty of simple models, *see, e.g.*, Daniel C. Goldstein & Gerd Gigerenzer, *The Beauty of Simple Models*, 6 Judgment & Decision Making, 392-395 (2011).
13. *See, e.g.,* Melvin J. Guyer & Anatol Rapoport, 2 x 2 *Games Played Once*, 16 J. Conflict Resol., 409-431 (1972).
14. As an aside, this model is also known as the "prisoners' dilemma." That is, scholars refer to the "prisoners' dilemma" (plural), with the apostrophe after the letter "s" (*see, e.g.,* Nicola Lacey, The Prisoners' Dilemma: Political Economy and Punishment in Contemporary Democracies (2008); David Lewis, *The Prisoners' Dilemma is A Newcomb's Problem*, 8 Phil. & Public Aff., 235-240 (1979); Gordon Tullock, *Adam Smith and the Prisoners' Dilemma*, 100 Q. J. Econ., 1073-1081 (1985)), and to the "*Prisoner's* Dilemma" (in the singular), with the apostrophe before the letter "s" (*see, e.g.*, Steven Kuhn, *Prisoner's Dilemma*, *in* The Stanford Encyclopedia of Philosophy (Edward N. Zalta ed., spring ed. 2009), *available at* http://plato.stanford.edu/archives/spr2009/entries/prisoner-dilemma (last visited July 11, 2014); William Poundstone, Prisoner's Dilemma (1992); Anatol Rapoport & Albert M. Chammah, Prisoner's Dilemma: A Study in Conflict and Cooperation (1965), but both the plural and singular versions of this term refer back to the same model of conflict and cooperation. Although the plural term (prisoners' dilemma) makes perfect sense, since the dilemma in this model confronts both players in the two-person version of the game and all players in the n-player version of the game, in this paper we follow the majority and thus refer to the dilemma in the singular (i.e. prisoner's dilemma).
15. *See, e.g.,* Dawkins, *supra* note 3, ch. 12. *See generally* Axelrod, *supra* note 11. *See also* Robert Alexrod & Douglas Dion, *The Further Evolution of Cooperation*, 242 Science, 1385-1390 (2002).
16. Kaye Mathiesen, *Game Theory in Business Ethics: Bad Ideology or Bad Press?*, 9 Bus.

game of strategy in all of social science,"[17] and even as "one of the greatest ideas of the twentieth century."[18] This popular parable has generated extensive commentary in a wide variety of fields, including mathematics, psychology, biology, economics, law, and philosophy.[19]

It was Bill Hamilton, however, along with his mathematically-minded cohort Bob Axelrod, a young game theorist and professor of political science at the University of Michigan in Ann Arbor, who were the first to "solve" the dilemma.[20] In her book, Segerstråle tells the story of this improbable and fortuitous collaboration. Specifically, in Chapter 16—a chapter aptly titled "Cooperation without Kinship"[21]—she explains how, although Hamilton and Axelrod worked in completely different fields, the prisoner's dilemma brought them together and led to their joint paper on "The evolution of cooperation," a paper which became one of the most cited and influential scientific papers of all time.[22]

Stated simply, the prisoner's dilemma involves two players, each of whom must decide whether to act altruistically or selfishly, *cooperate* or *defect*.[23] This simple scenario, however, presents a difficult dilemma because, even though it is in both players' *collective* interests to cooperate with each other, it is in each player's *individual* interest to defect (hence the dilemma).

Ethics Q., 37 (1999).

17. Sylvia Nasar, A Beautiful Mind: A Biography of John Forbes Nash, Jr., 118 (1998).
18. Poundstone, *supra* note 14, at 9.
19. For an overview of the role the Prisoner's Dilemma in these fields, *see generally* F.E. Guerra-Pujol, *The Parable of the Prisoners*, Social Science Research Network (June 2013), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2281593. *See also* references in Kuhn, *supra* note 14, at 64-70. In addition, a search for the term "prisoner's dilemma" (within quotes) turns up no less than 37,400 results on Google Scholar, while a search for "prisoners' dilemma" (in quotes) turns up 22,400 results. (Google searches conducted by the author on 10 July 2014.)
20. In his mid-thirties at the time, Axelrod was a full seven years younger than Hamilton.
21. Hamilton had previously posited kinship—or more generally, genetic relatedness—as one possible mechanism for promoting cooperation. *See* Hamilton, *supra* note 3. For a readable review of Hamilton's theory of kin selection, *see* Dawkins, *supra* note 3, ch. 6, especially at 90-94.
22. Robert Alexrod & W. D. Hamilton, *The Evolution of Cooperation*, 211 Science, 1390-1396 (1981).
23. For a full description and history of the prisoner's dilemma, *see generally* Poundstone, *supra* note 14. *See also* Guerra-Pujol, *supra* note 19.

At the time of their collaboration, Bob Axelrod was developing a wide variety of computer simulations of the dilemma.[24] Axelrod wanted to find out under what conditions, if any, cooperation was possible in the prisoner's dilemma. For his part, in his 1964 paper "The Genetical Evolution of Social Behaviour," Hamilton had already identified the conditions under which genetically-related individuals would act altruistically toward each other (i.e. *kin selection*). Yet because most plants and animals are genetically unrelated to each other, the evolution of cooperation among non-kin was still an unsolved mystery. Suffice it to say that Hamilton too wanted to solve this problem.

A few years earlier, Robert Trivers, a young theoretical biologist who at the time was still a graduate student at Harvard, had already proposed one possible evolutionary mechanism that could lead to cooperation among genetic strangers—a simple and straightforward mechanism he confusingly called "reciprocal altruism."[25] In the words of Richard Dawkins, who popularized the ideas of kin selection and reciprocal altruism his book *The Selfish Gene*, the simple intuition behind the concept of reciprocal altruism is the general notion that "you scratch my back, I'll ride yours."[26] But neither Trivers nor Dawkins were able to express this mechanism in formal or mathematical terms. Reciprocal altruism, in other words, was just another Popperian "conjecture," another unproven theory.[27]

Working together, Axelrod and Hamilton filled this theoretical gap by considering the possibility of future interaction. Specifically, they realized that cooperation or "reciprocal altruism" was, in fact, theoretically possible in the prisoner's dilemma, *but only if there was some positive probability that the players would meet again and interact in the future*. Simply put, the higher this probability of repeat interaction, which Axelrod and Hamilton denote with the variable w in their joint paper, the more likely cooperation will emerge, even among non-kin and even when such genetic strangers are trapped in a prisoner's dilemma. As Segerstråle articulates in her biography, "It is the shadow of the future in iterated Prisoner's Dilemma

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24. Segerstråle, *supra* note 1, at 242. *See generally* Axelrod, *supra* note 11.
25. *See* Trivers, *supra* note 3, reprinted in Robert L. Trivers, Natural Selection and Social Theory: Selected Papers of Robert Trivers (2002).
26. Dawkins, *supra* note 3, at 166.
27. For what it is worth, the same could be said about Charles Darwin's theories of natural and sexual selection. Darwin stated his theories of evolution in words, not mathematics.

games (the fact that they will meet again ...) that keeps the players in check and makes them choose more cooperative alternatives than in a 'one-shot' Prisoner's Dilemma situation."[28]

The isolation of the variable *w* was a huge theoretical breakthrough. Axelrod and Hamilton were the first to identify the conditions under which cooperation was possible in the prisoner's dilemma. Moreover, they were not only able to present their solution of the dilemma in a simple and elegant mathematical model—a feat which had eluded Trivers (and Charles Darwin, for that matter)—; they arguably discovered a possible evolutionary basis for cooperation and human ethics.

In addition, Axelrod and Hamilton's solution of the prisoner's dilemma is relevant to the study or practice of law because life is full of prisoner's dilemmas. Consider the following model of social behavior in the shadow of the law. One player—A, the "law-taker"—must decide whether to evade or comply with a particular legal rule, e.g. how much of one's income to report to the tax authorities. For simplicity, we can model this decision as a binary choice (i.e. comply or evade) or as a continuum (i.e. choosing a given level of compliance, or a level of evasion, from 0 to 1, with 1 being full compliance and 0 being complete evasion). Likewise, the other player—B, the "law-maker"—must decide whether to enforce the law or not, i.e. he must choose between aggressive or lax enforcement of the law. Again, this choice can be thought of as binary (enforce; do not enforce) or as falling on a continuum between 0 to 1, with 1 being perfect enforcement (Big Brother) and 0 being no enforcement at all (Anarchy). For simplicity, let us assume that the law-maker's choice is a binary one.[29]

This simple model thus follows the logic of the prisoner's dilemma studied by Hamilton. Suppose the law-taker promises the law-maker that he will comply with the law, and further suppose that the law-maker in return promises the law-taker not to enforce the law. A dilemma occurs because both players will most likely end up betraying each other. For example, Player A (the law-taker) has an incentive to break his promise if Player B (the law-maker) is not going to enforce the law. Knowing this, Player B has an incentive to enforce the law, knowing that Player A might

28. Segerstråle, *supra* note 1, at 249.

29. For a more complete description of this formal model of law, *see* F.E. Guerra-Pujol, *Evade or Comply?*, Social Science Research Network (June 2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1935040.

break his promise.[30] Furthermore, this dilemma occurs even if Player B promises Player A that he (Player B) will monitor the behavior of Player A and enforce the law "no matter what." Player A now has an incentive to comply with the law, but knowing this, Player B might in fact decide to not enforce the law, producing another dilemma.

To sum up, the law-taker and the law-maker are locked in a prisoner's dilemma, or "double-trust dilemma,"[31] because both the law-taker and the law-maker have strong incentives to defect. *Ceteris paribus*, the law-taker's best course of action depends on what the other player, the law-maker, is going to do. In brief, if the law-maker is going to enforce the law, the law-taker should comply, but if the law-maker is not going to enforce the law, the law-taker should evade. Now, consider this game from the law-maker's perspective (Player B). Again, *ceteris paribus*, the law-maker's best course of action depends on what the other player does: the law-maker should enforce the law if the law-taker is going to evade; if, however, Player A is going to comply anyways, Player B has no need to enforce the law.

Following in Bill Hamilton's evolutionary footsteps, one could model legal interactions formally, using a large population of law-takers and law-makers pursuing different strategies and playing against each other at random. Such a model might generate a "mixed equilibrium," one in which some law-takers, for example, comply with the law only some of the time, and this fraction of compliance, in turn, would depend on two things: (*i*) the values of the costs and benefits of compliance versus evasion and (*ii*) the costs and benefits of aggressive versus lax enforcement—a very Hamiltonian conclusion indeed!

30. If Player A then decides to comply with the law, then Player B might decide to not enforce the law, and we are back to where we started, with a Prisoner's Dilemma.

31. The term "double-trust dilemma" is from Robert Cooter & Hans-Bernd Schäfer, Solomon's Knot: How Law Can End the Poverty of Nations 27-38 (2012).

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IV. SCIENCE AS TRIAL ADVOCACY, OR AS A SEARCH FOR TRUTH

Bill Hamilton's ideas and his theoretical work in evolutionary biology—such as his simple taxonomy of social behaviors as well as his solution (with Axelrod) to the prisoner's dilemma—inform and enrich our understanding of the law and legal institutions. The question remains, however, whether law had any direct or indirect impact on Hamilton himself or on his conception of science.

Segerstråle's biography demonstrates that, in fact, the law did shape Hamilton's view of science, especially his views regarding the contingent nature of the process of "scientific justification."[32] Specifically, Hamilton saw the process of scientific justification—the way in which rival theories or paradigms in science compete with on another—in much the same way lawyers see the process of legal adjudication: not as a shared conversation between mutual friends but as an adversarial competition between opposing advocates.

Simply stated, Hamilton saw the process of scientific justification as a form of trial advocacy and scientists as advocates: "… in science, as in law, advocacy is not a matter of lying. You put the best case that you can for the theory you believe a likely winner; *but likewise you must do nothing to impede others who work similarly for the theories they favour*."[33] Ullica Segerstråle states that "Bill was different from some scientists, who may have tended to see science as more of a 'conversation'—that is, an enterprise where you publish something as soon as you think you have something to say and you then let others find the errors."[34] Instead, "he [Hamilton] recommended that scientists become more of advocates of their own ideas."[35]

Such a view distinguished Hamilton as someone who viewed individual scientists not as engaged in a disinterested or objective search for truth,

32. *See* Segerstråle, *supra* note 1, at 324. For a critical discussion of the distinction between discovery and justification, *see, e.g.,* Carl R. Kordig, *Discovery and Justification*, 45 Phil. of Science, 110-117 (1978).

33. Segerstråle, *supra* note 1, at 321 (quoting W.D. Hamilton, Narrow Roads of Gene Land 425 (2002) (emphasis added)).

34. *Id*. at 319.

35. *Id*. at 321.

but rather like barristers or trial lawyers—but instead of representing clients, they represent ideas and theories. Like trial lawyers, he posited, scientists are partisan *advocates* on behalf of their conjectures and theories.

The difference between science and law, however, is there is no settled arbiter of which scientific theories or conjectures are true. It is here, then, where Hamilton's advocacy model of science possibly misses the mark. In short, Hamilton's "advocacy model" of science might make sense in such rhetorical or aesthetic activities like law, literature, and politics. Pure science, by contrast, is not a beauty contest or a political campaign. Science is (or at least should be) about truth defined as falsifiable propositions—as opposed to politics, rhetoric, or aesthetics.[36] This is why activities like law, literature, and politics are not (and cannot be) "sciences," i.e. searches for truth based on testable or falsifiable conjectures. Of course, this is not to say that science, even "pure science," operates in a cultural or political vacuum. *Science, like any human activity, most definitely has values*, but its values are radically different from the aesthetic values of the arts—and also radically different from the adversarial values of such competitive activities like law or politics.

In litigation, for example, one could argue that judges and advocates have different utility functions. By way of example, the judge in a criminal case gets utility 1 for choosing the just action (convicting when guilty and acquitting when innocent) and utility 0 for choosing the unjust action (convicting when innocent and acquitting when guilty). The prosecutor gets utility 1 if the judge convicts and utility 0 if the judge acquits, regardless of the defendant's state, while the defense lawyer gets utility 0 if the judge convicts and utility 1 if the judge acquits, again, regardless of the defendant's state.[37] In other words, an ideal judge or juror in criminal case wants to make the correct legal decision, e.g. vote to convict when the defendant is, in fact, guilty, and vote to acquit when the defendant is innocent. An ideal advocate, by contrast, is focused on prevailing, independent of a particular defendant's actual guilt or innocence.

This distinction between the role of the advocate and the role of the

36. *See generally* Karl Popper, Conjectures and Refutations: The Growth of Scientific Knowledge (2d ed. 2002).

37. *See, e.g.*, Eric Kamenica & Matthew Gentzkow, *Bayesian Persuasion*,101 Am. Econ. Rev. 2591 (2011). *See also* F.E. Guerra-Pujol, *Bayesian Manipulation of Litigation Outcomes*, Social Science Research Network (May 2014), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2429460.

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judge has important implications for a comparison between law and science. In my view, a good scientist is not a mere advocate, a person who cares mostly about winning. Rather, he or she aspires to be more like a good judge. Of course, a real-life judge or juror may have certain predispositions or biases regarding a defendant's guilt (as we all do), but a good judge or juror is one who is prepared to update his prior beliefs, i.e. who is ready to change his mind based on the evidence.

It remains unclear why Hamilton saw science as a form of advocacy. It may be that Hamilton simply had an outdated and unrealistic picture of the legal system—a view of the legal process as a search for truth.[38] Hamilton himself once expressed that "… there is a lot to be said for everyone doing their own advocacy. Very possibly the truth comes faster that way--the courts, at least, seem to think so."[39]

Ironically, the prisoner's dilemma provides a radically different and perhaps more jaded picture of the criminal justice system and the legal process generally. In sum, a trial is not so much a search for truth as it is a one-shot prisoner's dilemma, a "game" in which the main object is to win. The prisoner and the prosecutor in this story do not care so much about the truth; what they care about the most is the outcome: the prisoner wants the lightest possible sentence, while the prosecutor wants the highest possible sentence. Of course, it may help to have the truth on one's side, but knowledge of the truth is neither a necessary nor sufficient condition for winning at trial, which is the ultimate goal of litigation from the perspective of the parties.[40] In law, this means that a legal trial is not a dispassionate or scientific search for truth. It is rather more like a bet or wager on which party's story or version of the "truth" is more likely

38. *See, e.g.,* Brady v. Maryland, 373 US 83, 86 (1963) (citation omitted) ("The State's obligation [in criminal cases] is not to convict, but to see that, so far as possible, truth emerges"). For an extended discussion of the Brady rule in criminal cases, *see* Robert Hochman, Brady v. Maryland *and the Search for Truth in Criminal Trials,* 63 U. Chi. L. Rev. 1673-1705 (1996).

39. Hamilton, *supra* note 6, at 414.

40. Moreover, although we shall not pursue this idea further here, it is important to note that the "truth" itself is a probabilistic concept, not an absolute one, and given the probabilistic nature of truth (i.e., given uncertainty as to what the "truth" is), a legal trial is thus a risk-taking activity, not a search for the truth. *See, e.g.*, F. E. Guerra-Pujol, *Visualizing Probabilistic Proof: The Case for Bayes*, 7 Wash. U. Jur. Rev., sec. 4 (forthcoming 2014).

to be accepted by the finder of fact.[41]

Although many people, like Hamilton, fall into the trap of assuming that legal trials are searches for truth,[42] the prisoner's dilemma tells us that this picture of the legal process is both naïve and unrealistic. In practice, a legal trial is a risk-taking activity,[43] or metaphorically speaking, a trial is more like poker and less like science.[44] Of course, one could argue that it is our ideal view of science (science as a search for truth)—and not Hamilton's view of science (science as partisan advocacy)—that is totally naïve and mistaken, that Hamilton's advocacy model of science provides a more accurate description of how science really operates in practice. If scientists, however, are mere advocates of their theories, then it is unclear who the judges are. Perhaps, as Thomas Kuhn famously argued,[45] it's scientists themselves.

V. CONCLUSION

In the end, Ullica Segerstråle's biography of Bill Hamilton's life and work is not just for evolutionary biologists, for Hamilton's work also deepens and enriches our understanding of human behavior and the law. Hamilton demonstrated that the relation between evolutionary biology and the study of law is not just a mere fad or one-night stand, but rather has the makings of a loving, lasting, lifetime marriage. Although Hamilton's view of science as a form of advocacy is problematic, his simple model of social behavior and his (and Axelrod's) solution of the prisoner's dilemma allows us see the law in new ways.

41. *See, e.g.*, Bruno de Finetti, Probability, Induction, and Statistics 82 (1972). *See also* Sharon Bertsch McGrayne, The Theory that Would Not Die 51-52 (2011); Nate Silver, The Signal and the Noise 255-256 (2012).
42. *See, e.g.*, Edward K. Cheng (2013), *Reconceptualizing the Burden of Proof*, 122 Yale L. J., 1213 (2013) ("the legal system's purpose is to discover a single, stable 'truth' or narrative"); *see also* Thomas A. Mauet, Trial Techniques 24 (8th ed. 2010) ("A theory of the case is a clear, simple story of 'what really happened' from your point of view … Trials are in large part a contest to see which party's version of 'what really happened' the jury will accept as more probably true").
43. For a risk-based analysis of litigation, *see, e.g.*, Tristan Barnett, *Applying the Kelly Criterion to Lawsuits*, 9 L., Probability & Risk, 139-147 (2010).
44. For a simple poker model of litigation, *see* F. E. Guerra-Pujol, *The Poker-Litigation Game*, 5 RESOLVED: J. Alt. Disp. Resol. (forthcoming 2015).
45. Thomas S. Kuhn, The Structure of Scientific Revolutions (3rd ed. 1996).

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