

2005

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### Recommended Citation

John K. Setear, *Room for Law: Realism, Evolutionary Biology, and the Promise(s) of International Law*, 23 BERKELEY J. INT'L LAW. 1 (2005).

Available at: <http://scholarship.law.berkeley.edu/bjil/vol23/iss1/1>

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# Room for Law: Realism, Evolutionary Biology, and the Promise(s) of International Law

By  
John K. Setear\*

The advocates of various paradigms in international relations (“IR”) theory contend for relative status with all the inordinate determination of the great houses of high-fashion design or the rowing crews of classic rivals in intercollegiate athletics. For decades, the dominant paradigm in that contest has been “realism,”<sup>1</sup> a theoretical perspective on international politics that emphasizes military competition<sup>2</sup> among self-interested states<sup>3</sup> embedded in an “anarchic”

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\* Professor of Law, University of Virginia School of Law. I am indebted for helpful comments to Tanisha Fazal, Anup Malani, James Ryan, Rachel Setear and Paul Stephan, as well as to participants in student-faculty colloquia at the University of Virginia School of Law and at the Boalt Hall School of Law at the University of California, Berkeley. The comments of Harland Bloland were especially helpful and detailed. Remaining errors are the product of insufficient intellectual selection pressure.

1. The seminal “neo-Realist” theorizing is unquestionably the work of Kenneth Waltz. See KENNETH N. WALTZ, *THEORY OF INTERNATIONAL POLITICS* (1979) [hereinafter WALTZ]; see also Kenneth Waltz, *Reflections on Theory of International Politics: A Response to My Critics*, in *NEO-REALISM AND ITS CRITICS* 322 (Robert O. Keohane ed., 1986) [hereinafter Waltz, *Reflections*]; cf. JOHN J. MEARSHEIMER, *THE TRAGEDY OF GREAT POWER POLITICS* (2001) (reformulating and updating neo-Realist theory). Neo-Realism dominates contemporary theorizing among Realists, and this Article uses “Realism” to mean neo-Realism.

“Classical” Realism, which emphasizes human nature and history, reaches essentially the same conclusions as neo-Realism, which emphasizes rational state behavior and microeconomic logic. For some classic works of classical Realism, see E.H. CARR, *THE TWENTY YEARS’ CRISIS 1919-1939* (1961); GEORGE F. KENNAN, *AMERICAN DIPLOMACY 1900-1950* (1951); HANS J. MORGENTHAU, *POLITICS AMONG NATIONS* (1948). See also Hans J. Morgenthau, *Positivism, Functionalism, and International Law*, 34 AM. J. INT’L L. 260 (1940) (discussing international law); Anne-Marie Slaughter Burley, *International Law and International Relations Theory: A Dual Agenda*, 87 AM. J. INT’L L. 205, 207-08 (1993) (describing classical Realism and its triumph over law-oriented, Wilsonian idealism).

2. See WALTZ, *supra* note 1, at 102 (“Among states, the state of nature is a state of war. This is meant not in the sense that war constantly occurs but in the sense that . . . war may at any time break out.”).

3. Realism is associated with state self-interest and the related concept of *realpolitik*, the characteristics of which, exhaustively listed, are these:

The ruler’s, and later the state’s, interest provides the spring of action; the necessities of policy arise from the unregulated competition of states; calculation based on these necessities can discover the policies that will best serve a state’s interest; success is the ultimate test of policy, and success is defined as preserving and strengthening the state. Ever since Machiavelli, interest and necessity—and *raison d’état*, the phrase that comprehends them—have remained the key concepts of *Realpolitik*.

*Id.* at 117.

international order.<sup>4</sup> IR Realists assume that states—the crucial unit of analysis<sup>5</sup>—are rational, unitary<sup>6</sup> actors<sup>7</sup> whose interactions in their struggle for power determine the important features of, and outcomes in, the international system.<sup>8</sup>

IR Realists are hostile to the possibility of widespread or longstanding international cooperation in peacetime. Realists believe that nations measure gains in relative terms,<sup>9</sup> and that such a metric makes cooperation fragile because an increase in the welfare of one state can come only at the expense of lessened (relative) welfare for other states.<sup>10</sup> In the military realm—the area of

4. “Anarchy” to the Realist is not pure chaos, but rather the lack of a centralized authority with coercive power over states. See *id.* at 102 (“Among men as among states, anarchy, or the absence of government, is associated with the occurrence of violence.”); *id.* at 104 (“Citizens need not prepare to defend themselves. Public agencies do that. A national system is not one of self-help. The international system is.”).

5. See *id.* at 95 (“States are the units whose interactions form the structure of international-political systems. They will long remain so.”). Realists thus differ from those who would assign a crucial role to domestic interest groups, international institutions, multinational corporations, or anything else.

6. See Andrew T. Guzman, *A Compliance-Based Theory of International Law*, 90 CAL. L. REV. 1823, 1836 (2002) (“NeoRealist theory, an outgrowth of classical Realism, treats states as unitary actors and as the relevant unit in international relations.”) (citation omitted). To treat a state as “unitary” is to assume that it acts as an individual with a unified decision-making apparatus rather than as, for example, a set of competing interest groups whose pulling and tugging results in state behavior. As Alexander Thompson summarizes:

Those who treat states as unitary assume either that the state aggregates all domestic preferences—of individuals, interest groups, and various intragovernmental actors—and acts as if it were a single actor or that state decision making is in fact channeled through a single or small group of crucial individuals who make important decisions.

Alexander Thompson, *Applying Rational Choice Theory to International Law: The Promise and Pitfalls*, 31 J. LEGAL STUDS. S285, S291 (2002); see also Brett Frischman, *A Dynamic Institutional Theory of International Law*, 51 BUFF. L. REV. 679, 701 (2003) (“Game theoretic (and institutionalist) analyses often focus on States as ‘players’ and assume that States are unitary rational actors acting to maximize their ‘individual’ welfare.”); cf. Rachel Brewster, *The Domestic Origins of International Agreements*, 44 VA. J. INT’L L. 501, 508 (2004) (“By describing state behavior as unitary and emphasizing the political bargaining only at the international level, however, this [institutionalist] approach has underemphasized the diverse domestic sources of government action.”).

7. A balance-of-power theory, properly stated, begins with assumptions about states: They are unitary actors who, at a minimum, seek their own preservation and, at a maximum, drive for universal domination. States, or those who act for them, try in more or less sensible ways to use the means available in order to achieve the ends in view. See WALTZ, *supra* note 1, at 118; see also Waltz, *Reflections*, *supra* note 1, at 339 (“The state in fact is not a unitary and purposive actor. I assumed it to be such only for the purpose of constructing a theory.”).

8. See John J. Mearsheimer, *The False Promise of International Institutions*, 19 INT’L SEC. 5, 9 (Winter 1994/95) (“Daily life is essentially a struggle for power.”).

9. *Id.* at 11 (“[S]tates in the international system aim to maximize their relative power positions over other states”); Joseph M. Grieco, *Anarchy and the Limits of Cooperation: A Realist Critique of the Newest Liberal Institutionalism*, 42 INT’L ORG. 485, 487 (1988) (“[S]tates are *positional*, not atomistic, in character”).

10. Waltz notes:

When faced with the possibility of cooperating for mutual gain, states that feel insecure must ask how the gain will be divided. They are compelled to ask not “Will both of us gain?” but “Who will gain more?” . . . Even the prospect of large absolute gains for both parties does not elicit their cooperation so long as each fears how the other will use its increased capabilities.

WALTZ, *supra* note 1, at 105. But cf. Duncan Snidal, *Relative Gains and the Pattern of International Cooperation*, 85 AM. POL. SCI. REV. 701 (1991) (discussing conditions under which cooperation can occur even between self-interested parties measuring gains in relative terms); Duncan Snidal, *Inter-*

international relations given pride of place by Realists<sup>11</sup>—the relative-gains metric exacerbates a “security dilemma”<sup>12</sup> already rife with the potential for spiraling mistrust fed by systematic misperceptions.<sup>13</sup> To the Realist, only the “balance of power” can keep leashed the dogs of war,<sup>14</sup> and even the alliances that result from restoring the balance of power are ephemeral.<sup>15</sup> For a state to rely upon anything but its own power and, occasionally, upon alliances formed to preserve that power, is at best pointless and at worst dangerously naïve.<sup>16</sup> With respect to that means of international cooperation most familiar to lawyers, in fact, the Realists have “left no room whatsoever for international law.”<sup>17</sup>

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*national Cooperation Among Relative-Gains Maximizers*, 35 INT'L STUDS. Q. 387 (1991) (same); John C. Matthew III, *Current Gains and Future Outcomes: When Cumulative Relative Gains Matter*, INT'L SEC., Summer 1996 (same).

11. See Mearsheimer, *supra* note 8, at 9 (“International relations is not a constant state of war, but it is a state of relentless security competition, with the possibility of war always in the background.”).

12. See Robert Jervis, *Cooperation Under the Security Dilemma*, 30 WORLD POL. 167, 169 (1978) (defining security dilemma as when “many of the means by which a state tries to increase its security decreases the security of others”); Charles L. Glaser, *The Security Dilemma Revisited*, 50 WORLD POL. 171 (1997).

13. See ROBERT JERVIS, *PERCEPTION AND MISPERCEPTION IN INTERNATIONAL POLITICS* (1976); see also John K. Setear, *Responses to Breach of a Treaty and Rationalist International Relations Theory: The Rules of Release and Remediation in the Law of Treaties and the Law of State Responsibility*, 83 VA. L. REV. 1, 72, 94-95 n.135 (1997) (describing misperception-spiral theory, discussing related literature, and applying theory to “proportionality” requirement for lawful responses to breach of international agreements).

14. Waltz argues that the balance of power is definitive not only of Realism but also of IR theory as a whole. See WALTZ, *supra* note 1, at 117 (“If there is any distinctively political theory of international politics, balance-of-power theory is it.”). But cf. Jack Levy, *Domestic Politics and War*, in *THE ORIGIN AND PREVENTION OF MAJOR WARS* 79, 88 (Robert Rothberg & Theodore Rabb eds., 1989) (asserting that the so-called “democratic peace hypothesis”—that one democracy will not find itself at war with another democracy—is “as close as anything we have to an empirical law in international relations”).

The reader with an eye for the absence of conventions will note the lack of any prefatory article in the title of Waltz's seminal book. Legend has it that, as the quotation from Waltz just above would predict, the author of *Theory of International Politics* maintained that his work was inarguably *the* theory of international politics, while his publisher, perhaps wishing to avoid offending potential future author-customers, wished to style the book as *a* theory of international politics. The resulting compromise, while not exactly Solomonic, nonetheless seems admirably inventive. (An author formulating an alternative paradigm, known as Constructivism and emphasizing the social construction of “reality” in the international realm, paid titular homage to Waltz right down to the absent article. See ALEXANDER WENDT, *SOCIAL THEORY OF INTERNATIONAL POLITICS* (1999)).

15. See Mearsheimer, *supra* note 8, at 11 (stating that “alliances are only temporary marriages of convenience, where today's alliance partner might be tomorrow's enemy, and today's enemy might be tomorrow's alliance partner.”).

16. Realists describe as “epiphenomenal” the apparent impact of cooperative endeavors upon international politics, by which they mean that the cooperation is nothing more than a manifestation of underlying power relationships. See Mearsheimer, *supra* note 8, at 14 (using NATO as an example of an epiphenomenal institution). Mearsheimer not only upbraids theoreticians for confusing epiphenomena with reality but also concludes his article with a warning to policy-makers:

There is a downside for policymakers who rely on institution[s] . . . [T]he false belief that institutions matter . . . has had pernicious effects. Unfortunately, misplaced reliance on institutional solutions is likely to lead to more failures in the future.

*Id.* at 49. Mearsheimer also undertakes a lively, but more academically oriented, critique of those IR theorists who support a role for institutions in international politics. See *id.* at 15-37.

17. Burley, *supra* note 1, at 217.

I argue in this Article that the international system in fact has ample room for law. I first elaborate upon a crucial, though sometimes implicit, assertion of the Realists that I call the "Selection Axiom": strong selection pressure in world politics forces states either to practice a law-free *realpolitik* or to perish. I then draw upon the selection-oriented theory of evolutionary biology<sup>18</sup> to argue, in the main portion of the Article, that the Realists' Selection Axiom is supported neither by logic nor facts. I conclude by arguing that the invalidity of the Selection Axiom leaves substantial room for international law in world politics.

My argument against the Selection Axiom has five parts. First, the Realists' inference that low state extinction rates in the present are the result of *high* selection pressure on states in the past is fallacious. Low state extinction rates are at least as consistent with an international environment reflecting little or no selection pressure as they are with the Realist view. In fact, high state extinction rates would more conclusively demonstrate the existence of high selection pressure in the international system.

Second, an examination of relevant empirical evidence concerning state survival rates suggests that, contrary to the assertion of the Selection Axiom, selection pressure on states is in fact low. Births of states in the modern era far outnumber deaths—the antithesis of the Malthusian situation that one would expect in an environment of high selection pressure. Indeed, since 1945, state death has virtually ceased while state births have skyrocketed, and thus whatever selection pressures might once have existed would appear to have vanished.

Third, evolutionary biology teaches us that evolution towards higher adaptive fitness reliably occurs only in a population with a *large* number of individuals. The international environment, in contrast, involves an almost vanishingly *small* number of individuals (i.e., states) compared to natural populations. In small natural populations, random "genetic drift" is likely to be a powerful factor; analogously, the tiny population of states is one in which any number of factors besides a ruthless concern for state survival may be important.

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18. The discussion of evolutionary biology throughout this Article draws heavily upon Mark Ridley's *Evolution*. See MARK RIDLEY, *EVOLUTION* 69-150 (2nd ed. 1996). Ridley's collegiate-level textbook requires careful attention but relatively few mathematical skills. I also draw extensively upon Douglas Futuyma's survey of the same general sort. See DOUGLAS J. FUTUYMA, *EVOLUTIONARY BIOLOGY* (1998). Those more comfortable with quantitative exegeses may consult works on "population biology" or "population ecology."

Entirely equation-free accounts of evolution are available as well. The extraordinary *opus* of biologist Ernst Mayr allows one to choose a cogent account of evolutionary theory of nearly any length that one might desire. See ERNST MAYR, *ONE LONG ARGUMENT* 35-47 (1991) (dividing Darwin's thought into, and providing intellectual-historical context of, five sub-theories); ERNST MAYR, *THIS IS BIOLOGY* 175-206 (1998); ERNST MAYR, *WHAT EVOLUTION IS* 83-156 (2001) (discussing inheritance, natural selection, adaptation, and other aspects of evolutionary theory applicable at the level of individual organisms). One commendably concise summary of evolutionary theory is actually by an IR specialist. See Miles Kahler, *Evolution, Choice, and International Change*, in *STRATEGIC CHOICE AND INTERNATIONAL RELATIONS* 165, 168-70 (David A. Lake & Robert Powell eds., 1999).

For a graphically appealing account of evolutionary theory that discusses the intellectual history of evolutionary theory with a minimum of explicit discussion of its underlying ideas, see CARL ZIMMER, *EVOLUTION* 73-97 (2001). For a similarly informal account that concentrates on Darwin's own ideas, see JONATHAN MILLER, *DARWIN FOR BEGINNERS* (1982).

Fourth, the vast majority of state deaths in the modern era occurred during one of two waves of “mass extinctions” in Europe, with a very low rate of state extinction at other times and in other places. Such a pattern—long periods of stasis interrupted by temporally and geographically intense flux—suggests what evolutionary biologists call a “punctuated equilibrium.”<sup>19</sup> Natural extinctions that occur within the context of a punctuated equilibrium are typically more a matter of chance than of classical fitness. Similarly, the existence of a punctuated equilibrium in international politics implies that the demise of a particular state stems more from bad luck than from a state’s unwillingness or inability to conduct a foreign policy of law-free *realpolitik*.<sup>20</sup>

Fifth, evolutionary biologists have concluded that sexual reproduction is a more adaptive mechanism than asexual reproduction when—but only when—environmental change is rapid and complex. If the relevant analogies between biology and international relations hold true—analogs that are admittedly somewhat difficult to draw with respect to reproduction—then high selective pressure in an international environment where change is rapid and complex should result in a method of state reproduction closer to sexual than to asexual reproduction. While state “reproduction” almost certainly occurs in an international environment of rapid and complex change, the most common method of state “reproduction” in fact appears much more closely akin to *asexual* reproduction. Evidence from the international environment is thus inconsistent with the expectation under the Selection Axiom that selection pressures would have pushed the relevant population (in other words, the set of nation-states) towards the fitter mode of reproduction (in other words, “sexual” reproduction).

From these multiple analyses of Realism as illuminated by evolutionary biology, I conclude that the Realists’ Selection Axiom rests on ground so unstable as to risk intellectual liquefaction. The Realist contention that low state extinction rates indicate high selection pressures is fallacious. Many more states have been born than have died. Analogies in the international system to the phenomena of genetic drift and punctuated equilibrium imply that fate—not fitness—is the most prominent determinant of survival in the state system. The *less* fit mode of reproduction actually dominates the international system. In light of all these arguments taken together, the Selection Axiom is untenable.

If the international system places minimal selective pressure upon modern states, then states may conduct their foreign policy free from the Realist shackles of a narrowly conceived national self-interest focused exclusively on power and survival. Of particular importance for those interested in international law, the irrelevance of the Selection Axiom makes room for a foreign policy that treats international law as a useful and significant constraint upon state behavior in international politics. Cooperation offers the promise of signif-

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19. Many associate this concept with the late Stephen Jay Gould. For a discussion of the concept, see *infra* Section V.

20. Both genetic drift and punctuated equilibrium imply a greater role for chance than for adaptive fitness. They are independent phenomena, however. Both appear to be present in international relations.

icant rewards, especially if measured in absolute terms, rather than the ultimate punishment of state extinction. States may make choices in foreign policy resulting from domestic politics, including the creation by rule-of-law democracies of “zones of law” in which international legal cooperation is a familiar, well-followed approach to international relations. Cooperation through international law, even if practiced only among relatively small groups of states, can lead to prosperity for its practitioners. The refutation of the Selection Axiom leaves a great deal of freedom for these ideas, all of which imply that states may employ and respect international law without hazard to their health.

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Part I sets out the Selection Axiom. Parts II through VI criticize the Selection Axiom from a variety of viewpoints, all informed by analogies to evolutionary biology. Part VII examines the variety of avenues for conducting and defending international legal cooperation that are available if international relations need not obey the strictures of the Selection Axiom. A concluding section briefly discusses the methodological implications of the Article.

# I.

## THE “SELECTION AXIOM” IN REALIST INTERNATIONAL RELATIONS THEORY

The “security dilemma” and the “balance of power,” both fundamental concepts in Realist theories of international relations, are dynamic theories: they predict the reaction of states, after a time lag of unspecified duration, to actions by one or more other states. The security dilemma exists because, after one state initially acts to increase its perceived security, other states react with fear or suspicion—and then *respond* with concrete measures of their own that rebound to the detriment of the perceived security of the initial actor. The balance of power, similarly, exists because, after one or more states threaten hegemony, other states respond by banding together in temporary alliances to restore the balance of power.

If states act in the international realm as if their policymakers have accepted the Realist world-view, then the security dilemma and the balance of power are at least plausible descriptions of how international relations might unfold. However, theorists of international relations who espouse the Realist cause do not simply *assume* that states behave as if national decision-makers are Realists. Rather, Realists *argue* that states must behave as if they were Realists *or face extinction*. Under the Realist view, the international system will gradually come to reflect the dynamics predicted by Realist theories of international relations as selection pressure forces states without a Realist foreign policy out of the system, and into oblivion.<sup>21</sup>

21. Peter D. Feaver, *To the Editors, in Correspondence, Brother Can You Spare a Paradigm (Or Was Anybody Ever a Realist?)*, 25 INT’L SEC. 165, 166 (2000) (stating that “Realist theories are as much about the *consequences* of behavior as about the *determinants* of behavior.”) (emphasis in original).

This selection-oriented argument is crucial to the Realist position. As Waltz himself puts it: "We should keep the notion of 'selection' in a position of central importance."<sup>22</sup> One scholar summarizes this aspect of the theory:

Waltz argues that states that fail to behave according to neoRealist prescripts will be selected out of the system . . . . The anarchy that defines the neoRealist world means that states must be ever vigilant, because attacks can happen without warning, and because states seek survival at the least and world conquest at the most. In this very dangerous world, failure to follow this dogma is severely punishable, even by death.<sup>23</sup>

Waltz's Realist view that the international system imposes high selection pressure on states in turn greatly favors the adoption of Realist policies by states if they are to survive:

A self-help system is one in which those who do not help themselves, or who do so less effectively than others, will fail to prosper, will lay themselves open to danger, will suffer. Fear of such unwanted consequences stimulates states to behave in ways that tend toward the creation of balances of power. Notice that the theory requires no assumptions of rationality or of constancy of will on the part of all of the actors. The theory says simply that if some do relatively well, others will emulate them or fall by the wayside.<sup>24</sup>

Indeed, less successful states may not simply "fall by the wayside" but wind up as road kill: "What if a state does not conform to systemic pressures? Waltz's answer points to the causal mechanism that drives his balance-of-power theory. The system will punish the state, and the state may even disappear."<sup>25</sup>

High selection pressures will lead to the convergence of state behavior at the domestic level, as less successful states copy the instruments of national power employed by states successful at conquest (or self-defense):

The possibility that conflict will be conducted by force leads to competition in the arts and the instruments of force. Competition produces a tendency towards sameness of the competitors. Thus Bismarck's startling victories over Austria in 1866 and over France in 1870 quickly led the major continental powers (and Japan) to imitate the Prussian military staff system, and the failure of Britain and the United States to follow the pattern simply indicated that they were outside the immediate arena of competition.<sup>26</sup>

In the view of Realists, the high stakes and constant competition of world politics force even states with very different domestic systems to behave in essentially similar ways in the international realm:

The effects of competition are not confined narrowly to the military realm. Socialization to the system should also occur. Does it? . . . One should look for instances of states conforming to common international practices even though for internal reasons they would prefer not to. The behavior of the Soviet Union in its early years is one such instance. The Bolsheviks in the early years of their power

22. Waltz, *Reflections*, *supra* note 1, at 331.

23. Tanisha M. Fazal, *State Exit from the International System*, 58 INT'L ORG. 311, 315 (2004) (citation omitted).

24. WALTZ, *supra* note 1, at 118; cf. Waltz, *Reflections*, *supra* note 1, at 331 ("That some states imitate the successful practices of others indicates that the international arena is a competitive one in which the less skillful must expect to pay the price of their ineptitude.").

25. Feaver, *supra* note 21, at 166.

26. WALTZ, *supra* note 1, at 127.



preached international revolution and flouted the conventions of diplomacy . . . . In a competitive arena, however, one party may need the assistance of others. Refusal to play the political game may risk one's own destruction. The pressures of competition were rapidly felt and reflected in the Soviet Union's diplomacy.<sup>27</sup>

The convergence of state goals, concerns, and means does not, however, lead to self-restraint, centralized authority, or the primacy of law:

*National* politics is the realm of authority, of administration, and of law. *International* politics is the realm of power, of struggle, and of accommodation. The international realm is preeminently a political one.<sup>28</sup>

I call the selection-oriented Realist argument the "Selection Axiom" and formulate it as follows: strong selection pressures in the international system force states into a stark choice between, on the one hand, the conduct of a rational, self-interested foreign policy in which international legal constraints are irrelevant, and, on the other hand, the extinction of the state.

The survivors among states in a world that matches the assumptions and conclusions of the Realists, then, will be those states that have succeeded in conducting, whether by design, emulation or chance, a wise and well-focused foreign policy. Even if the pool of states initially contains many irrational, inept or inattentive states, the set of states will eventually come to consist only of rational, capable, self-interested states. The rational geopolitical egoists will conquer all others. Only the fittest will survive, although some of the survivors may be fit by virtue of emulating those others who were for a brief moment the very fittest of all.<sup>29</sup>

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The relationship between the Selection Axiom, as propounded by Waltz and adopted implicitly or explicitly by other Realists, and subsequent scholarship in IR theory is complex. Direct criticism of the Selection Axiom, on its own terms, has been rare. Although criticism of Realism as a whole is hardly in short supply, the opponents of Realism have almost entirely ignored the Selection Axiom in favor of concentrating their fire on Realism's emphasis on the rational and unitary state, on relative gains, and on security issues.<sup>30</sup>

Others have noted that the Selection Axiom leaves unspecified a significant number of assumptions crucial to any scholar attempting to operationalize the theory and perform empirical tests.<sup>31</sup> Ann Florini not only undertakes a trench-

27. *Id.* at 127-28.

28. *Id.* at 113 (emphasis added).

29. Note that this version of the Realist argument is *not* grounded in sociobiology or its clone, "evolutionary psychology." The pressure of selection operates on states, not on individual humans; the relevant adaptations occur at the level of states, not individuals. For an abridged and helpfully illustrated edition of the seminal sociobiological work, however, see EDWARD O. WILSON, *SOCIOBIOLOGY: THE ABRIDGED EDITION* (1980). For an application of sociobiology to Realism by way of the behavior of individuals, see Bradley A. Thayer, *Bringing in Darwin: Evolutionary Theory, Realism, and International Politics*, 25 INT'L SEC. 124 (2000).

30. See Setear, *supra* note 13, at 2 nn. 2 & 3, 6 n. 8, 9 n. 9 (gathering criticisms).

31. See Kahler, *supra* note 18, at 181 (stating that Waltz "never elaborates a clear intervening indicator of differential 'success' (apart from simple survival), a clear portrait of the competitive environment, or an assessment of how the selection environment varies over time"). Kahler has

ant criticism of the dynamic aspects of Realism but also offers a theory of change in international politics that she bases quite self-consciously upon a comprehensive analogy to evolutionary biology.<sup>32</sup> For reasons that she ably defends, however, Florini eschews any use of the state itself as the unit of selection.<sup>33</sup>

In contrast, several IR theorists have followed the Selection Axiom by not only taking an evolutionary perspective but also by treating the state as the relevant unit of selection.<sup>34</sup> Nonetheless, such scholars focus upon the scale or scope of the state rather than, as the Selection Axiom does, upon its foreign policy. One scholar, in discussing whether Waltz relies upon an assumption of state rationality, devotes a single sentence to criticizing Waltz's use of the Selection Axiom: "This evolutionary principle, however, can hold only for systems with many actors, experiencing such severe pressure on resources that many will disappear over time."<sup>35</sup>

Perhaps the general lack of direct criticism of the Selection Axiom is a result of the Realists' failure to specify precisely the assumptions and implications of their own theory. As one can see from the descriptions above, the seminal work in modern Realist thought does not discuss the Selection Axiom at a very high level of specificity. My formulation of the Selection Axiom must therefore be an inference from, and a paraphrase of, a diffuse and often anecdotal set of statements about a logically crucial portion of Realist theory.

This Article is much more specific than existing efforts in political science have been in examining the underpinnings of the Selection Axiom. Focusing on the principles of biology, I examine such topics in natural selection as superfecundity, sexual reproduction, and mass extinctions. Realists do not directly base their theories on such detailed biological phenomena; indeed, they do not even mention such aspects of evolutionary biology. They do not generally choose between the framework of natural selection and that of market-based selection. They do not sketch out the methods of transmission or recombination from generation to generation; indeed, they do not define what the generation is. To Realists, the story is one of "pressure" and thus of "selection" with little more. In that sense, this Article can only be an indirect criticism of Realist theory. Direct engagement with the aptness of particular biological metaphors would require that the Realists had addressed such issues. The approach of this Article is rather to draw from evolutionary biology a variety of logical and empirical implications that must or can bear upon the conceptualization of the Se-

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similar concerns of definitional rigor about the application to international relations of organizational ecology, evolutionary economics, and evolutionary game theory. *See id.* at 174-80.

32. Ann Florini, *The Evolution of International Norms*, 40 INT'L STUD. Q. 363 (1996). Florini argues that the relevant unit of selection is not the state, but the norms adopted by states (and by other international actors).

33. *Id.* at 370.

34. Richard Bean, *War and the Birth of the Nation-State*, 33 J. ECON. HIST. 203 (1973); HENDRIK SPRUYT, *THE SOVEREIGN STATE AND ITS COMPETITORS* (1994).

35. Robert O. Keohane, *Theory of World Politics: Structural Realism and Beyond*, in NEOREALISM AND ITS CRITICS *supra* note 1, at 173.

lection Axiom in international relations, for evolutionary biology fortunately is not as radically undertheorized as is the Realists' Selection Axiom.

In contrast to all of the discussions of Realist theory described above, therefore, I undertake a sustained analysis of the Selection Axiom *and* continuously indulge its assumption that the state is the crucial focus of selective pressures *and* draw extensively upon principles of evolutionary biology to illuminate its multiple shortcomings. Rather than attacking fundamental Realist assumptions about relative gains or state-centrism or the primacy of security issues, as so many others have done before, I grant Realists *all* of these assumptions and demonstrate that the flaws in the Selection Axiom are *still* sufficiently profound to leave ample room for international law in the international relations of rational, unitary states.

## II.

### LOGICAL FALLACIES IN THE SELECTION AXIOM

In this Part of the Article, I examine the faulty logic underlying the Realist contention that low rates of state extinction indicate high selection pressures. In Part III, I argue that an empirical examination of state survival rates implies that selection pressure upon states in the international system is low. I then argue, in Parts IV and V, that conditions in the international system are closely analogous to two biological phenomena—genetic drift and punctuated equilibria—that imply low selection pressures and a large role for chance. In Part VI, I argue that the mode of biological reproduction more closely parallel to state “reproduction” is *not* the fitter mode of reproduction given the nature of the international environment. If one takes seriously all these arguments derived from an examination of evolutionary biology, then one can hardly take seriously the Selection Axiom. In Part VII, I then discuss how a foreign policy based upon taking international law seriously can occupy the room left open in international relations after setting the Selection Axiom aside.

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As described in Part I, the Realists maintain that the strong selection pressures inherent in an anarchical international system will lead to geopolitical egoism and emulation, rather than extensive cooperation, among those states hardy enough to survive. Traditionally, the Realists have also faced a fact that one might imagine undercuts this perspective: state extinction is rare. Waltz, for example, readily acknowledges that state death is less frequent than the demise of multi-national corporations:

The death rate among states is remarkably low. Few states die; many firms do. Who is likely to be around 100 years from now—the United States, the Soviet Union, France, Egypt, Thailand, and Uganda? Or Ford, IBM, Shell, Unilever, and Massey-Ferguson? I would bet on the states, perhaps even on Uganda.<sup>36</sup>

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36. WALTZ, *supra* note 1, at 95. One can hardly fault Waltz for thinking that, from the vantage point of the late 1970s, the Soviet Union was less likely to perish than Uganda.

Undeterred by the low death rate among states, the Realists argue that the rarity of state extinction in fact supports their argument. In a world in which selection pressures have existed for hundreds of years, the Realists argue, one should in fact expect to see low current rates of state extinction. Under this view, the unfit nations have *already* been selected out. Extant nations have survived centuries of earlier struggle and, gimlet-eyed and geopolitically savvy, should have continued to survive throughout the more recent past. Analogously, post-Cretaceous reptilian predators like the alligator have survived through the millennia, subject to strong selection pressures all along; one would predict that the modern alligator would be hardy. One cannot gainsay the logic of this argument, taken on its own: in an environment characterized by long periods of strong selection pressure from a constant and ongoing source, the current inhabitants of that environment are likely to be well suited to their environs and thus are unlikely to go extinct.

There are, however, two problems with the Realists' attempt to harmonize low state death rates with high selection pressures. Perhaps the most glaring difficulty is what Realists do *not* note: in an environment characterized by long periods of *no* selection pressure from any source, the current inhabitants of that environment are *also* unlikely to go extinct. With no selection pressure, entities of all stripes will survive. The absence of pervasive state deaths is, therefore, consistent with both the Selection Axiom *and* its precise opposite. The *presence* of pervasive state death would be inconsistent with the Realist argument that states are well suited for their environment as a result of a long period of high selection pressure, but the *absence* of pervasive state death is consistent with *either* the presence of highly fit organisms *or* the absence of selection pressures. The Realist argument that low rates of state deaths affirm the adaptive fitness of modern states is therefore logically indeterminate: low extinction rates are consistent not only with the Realist assertion of high adaptive fitness among contemporary states (owing to high selection pressure in the past), but also with a directly opposed assertion of *low* selection pressures.

However, indeterminacy is not the only logical difficulty with the Selection Axiom. If the Realists wish to argue that low recent extinction rates are consistent with the prior existence of strong selection pressures, they must also argue that *the same* selection pressures that existed in the past still exist in the present. If selection pressures are both strong *and* consistent through time, then those entities present after the passage of significant amounts of time will be highly fit for their environment and so will be unlikely to suffer extinction. However, if selection pressure is strong but from *variegated* sources, then the previously fit inhabitants of the environment will be *poorly* adapted to the new environment and will perish in large numbers.

A well-known example from recent natural history may be illustrative.<sup>37</sup> The peppered moth, *Biston betularia*, is native to northern Europe, including

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37. The discussion of this paragraph draws heavily upon the account in RIDLEY, *supra* note 18, at 103-09. Futuyma discusses the example of the peppered moth in much less detail, FUTUYMA, *supra* note 18, at 158-59, but he nonetheless describes it as "[t]he best known and most carefully

northern England. The peppered moth spends a great deal of time in the presence of both birch trees and predatory birds. The bark of the birch tree is white in a state of nature, especially when covered with a commonly present variety of lichen. At the onset of the Industrial Revolution, the peppered-moth population consisted almost entirely of lightly colored moths. Inferentially, the prevalence of this coloration was a result of strong selection pressure against highly visible, dark moths—easy prey for watchful, hungry avians. A small number of darkly colored members of the species survived, however. Soot from the smokestacks of the factories of the Industrial Revolution in northern England blackened the bark of birch trees near Manchester and killed the associated lichen. In much less than a century—the geological blink of an eye—the population of peppered moths near Manchester consisted almost entirely of darkly colored individuals. Those moths born with dark coloration were more difficult for predators to find on sooty trees and therefore much more likely to survive to pass on their genes, including those controlling their coloration. Over only a brief period of time, selection pressures operated to swing the balance of coloration in the moth population from light to dark—even though the *initial* predominance of light moths had presumably been due to the operation over long periods of time of strong selection pressures.

Indeed, the story of the peppered moth has another turn—one that also emphasizes the transience of fitness in at least some circumstances. The genes of light-colored peppered moths have in the recent past been the unintended beneficiaries of successful human efforts to reduce industrial air pollution. The skies of northern England are no longer as sooty as they once were, and light peppered moths are seen with increasing frequency in the population. What once was a losing trait (dark coloration) became a winning trait during the 1800s and well into the 1900s, and then that winning trait in turn lost ground later in the 20th century to a newly viable alternative. Changes in the observed frequency of moth coloration were frequent during *both* the increase and the decrease in the Industrial Revolution's air-borne offal.

The various turns of the peppered moth's story illustrate that even an organism that has evolved over a long period of time to a state of dominant fitness may suffer a rapid reversal of fortune. Realists argue that a low rate of state death is consistent with high selection pressures in the past, but such an argument will hold true only if, in contrast to the environment of the peppered moth, the environment of international relations has been highly stable.

Is the international system so much more constant than the soot output of Manchester's factories? The question is far from merely rhetorical. Unless the international environment is constant, the absence of state extinction is evidence only for a *lack* of selection pressures, rather than for a system in which the unfit have fallen victim to strong selection pressures. In an international environment that is not constant, high selection pressure over time would not result in low

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studied case of directional [fitness-related] selection at a single locus in natural populations." *Id.* at 158.

state extinctions because states would not have sufficient time to adapt to their environment. The asserted fitness of extant states, in other words, depends upon the criteria for their fitness having been constant over time.

On one level, the Realist might well answer “yes” to this question of international constancy: the balancing of power and the need for states ceaselessly to struggle for relative security advantages are phenomena with a timeless quality about them, at least to the Realist. As Waltz puts it:

Thinking only of the modern state system, conventionally dated from 1648, today’s states are hardly recognizable when compared with their originals even where their names survive from a distant time. Through all of the changes of boundaries, of social, economic, and political form, of economic and military activity, the substance and style of international politics remains strikingly constant. We can look farther afield, for example, to the China of the warring states era or to the India of Kautilya, and see that where political entities of whatever sort compete freely, substantive and stylistic characteristics are similar . . . Balance-of-power politics in much the form that we know it has been practiced over the millennia by many different types of political units, from ancient China and India, to the Greek and Italian city states, and unto our own day.<sup>38</sup>

Perhaps Waltz is correct, and Machiavelli could take Mubarak’s place in formulating foreign policy without difficulty. At any level of analysis below the most abstract, however, the characteristics allowing states successfully to navigate the Thirty Years War would not seem to be the same characteristics allowing states to prosper in the era following the Cold War. Certainly a robust line of kingly successors and a warm relationship with mercenary troops has not, at least since Napoleon, been the ticket to national success. Indeed, Waltz himself believes, as stated just above, “states are hardly recognizable when compared with their originals.”<sup>39</sup> If states are shaped by their environment, and no state is a recognizable version of the initial set of states, then it seems only reasonable to conclude that the criteria for state success have changed dramatically since the origin of the state system. To the degree that the fitness criteria in international relations *have* changed over time, the lack of state extinctions in the recent past is evidence only of a general lack of selection pressure—not a demonstration of the Selection Axiom’s assertion that environmental pressures have fine-tuned state fitness over a long period of time and have left behind only well-adapted states.

### III.

#### THE EMPIRICAL CASE AGAINST THE SELECTION AXIOM

The previous section examined logical flaws in the Selection Axiom stemming from its assertion that low current rates of state extinction reflect an environment of high selection pressure. This asserted correspondence depends upon both a logical indeterminacy and upon an eminently contestable assumption of constancy in the environment of international relations surrounding states. This section criticizes the Selection Axiom from an empirical rather than a logical

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38. Waltz, *Reflections*, *supra* note 1, at 329-30, 341.

39. *Id.* at 329.

perspective. Realists (and other IR theorists) have assumed that the rate at which states exit the international system is extremely low. Recently, however, Tanisha Fazal has actually gathered and analyzed the relevant data and concluded that, relative to the assumptions of political scientists, state deaths are in fact fairly high.<sup>40</sup> Some of Professor Fazal's assumptions are contestable, but the death rate in the international system *compared to the death rate in natural environments* remains extremely small even under those assumptions leading to a relatively high rate of state deaths. The relative selection pressure facing states, as opposed to organisms, therefore remains much smaller. Additionally, investigation of state *births* raises a serious challenge to the empirical underpinnings of the Selection Axiom.

#### A. Evidence on State Deaths

As mentioned above, Realists are commendably clear in stating their empirical position on state death: "The death rate among states is remarkably low. Few states die; many firms do."<sup>41</sup> After a careful analysis of the relevant data generated by the international system, however, Fazal has concluded that roughly one in four states perished during the post-Napoleonic era.<sup>42</sup> A 25% extinction rate is, presumably, significantly higher than the "remarkably low" extinction rate previously assumed by Realists. This section analyzes the effect on the validity of the Selection Axiom of this new, higher extinction rate. This section also considers measures of state extinction besides those employed by Fazal, who focuses on the loss of formal control over foreign policy as the measure of state extinction. Finally, this section compares the death rate in natural populations to the state death rate in international relations. I conclude that Fazal's estimate of the rate of state extinction should prompt the conscientious Realist to re-assess, although not necessarily abandon, the Selection Axiom: Fazal's estimate of the rate of state extinction is higher than "remarkably low." While the use of some plausible alternative definitions of state death might reduce Fazal's estimates somewhat, the central Realist contention that current rates of state extinction are very low would remain far from certain. Nonetheless, selection pressures in *natural* populations lead to death rates for organisms that are many orders of magnitude higher than the death rates observed in the population of states in the international environment, regardless of the estimate of state death rates that one adopts.

Defining a state's death as "the formal loss of control over foreign policy to another state," and using data from the oft-studied Correlates of War Project (CoWP), Fazal concludes that fifty of the 202 states belonging to the international system at one time or another between 1816 and 1992 have perished, as shown here in Table One.<sup>43</sup> Thirty-five of those fifty met a violent end.<sup>44</sup> As

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40. Fazal, *supra* note 23, at 312.

41. WALTZ, *supra* note 1, at 95.

42. Fazal, *supra* note 23, at 312.

43. *Id.*

44. *Id.* at 319.

Table Two shows, only nine of the twenty-three states extant in 1816 survived continuously to 1996.<sup>45</sup> Compared to the Realists' assertion that state death rates are "remarkably low," Fazal's evidence would seem more readily to support assertions of a significant ongoing lack of fitness in the international system, or at least of a relatively high rate of state exit (25%) with a significant portion of all states (thirty-five out of 202, or more than 15%) ever extant during the post-Napoleonic era having exited as a result of foreign conquest.

At the same time, however, Fazal notes that state extinction has been virtually absent from the international system since 1945.<sup>46</sup> Only eight states exited after 1945, and only two exited violently. She notes also that "buffer" states—nations with the misfortune to occupy territory on an overland route between two rival powers—are much more likely to suffer state death (roughly 1.5 times more likely) than non-buffer states.<sup>47</sup> Furthermore, as I discuss at more length in section V below, European states are much more likely to die than non-European states. Selection pressure, as measured by death rates, therefore remains quite low for non-European states, for non-buffer states, and for all states created after, or existing in, 1945.

Taken as a whole, Fazal's analysis is not necessarily inconsistent with the essentials of the Realist position. However, Fazal's analysis does require a more elaborate defense of the Selection Axiom than that reflected in the essentially data-free discussion undertaken by Waltz. The interpretation of Fazal's data that requires the least revision of the Realist arguments surrounding the Selection Axiom, however, would be the relatively simple argument that her data do *not* in fact reflect a high extinction rate. Even under Fazal's interpretation of the data, after all, fewer than one in six states has left the international system as a result of conquest, and less than 2% of states have suffered such a fate since 1945. This post-1945 rate might fairly count as "remarkably low." One might additionally argue that the overall rate of roughly 17% is low enough, even if it is not remarkably low. If one considers state extinction rates to be low even in light of Fazal's data, then a Realist may preserve the Selection Axiom without change.

The dramatic drop-off in state extinction rates since 1945 is also consistent with the Realist assertion that strong selection pressures have weeded out the weak, at least as of the end of World War II. A Realist who simply moved back the date when selection pressures had already done their work from 1815 to 1945 could otherwise preserve the arguments of the Selection Axiom. Finally, as we shall see in more detail in the next sub-section, even a death rate for states of 25% is dramatically smaller than death rates for a single generation in many natural populations.

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45. UNIVERSITY OF MICHIGAN, CORRELATES OF WAR PROJECT, at <http://pss.la.psu.edu/int-sys.html> (last modified Feb. 10, 2003).

46. Fazal, *supra* note 23, at 330.

47. *Id.* at 329, 331.



TABLE ONE: EXITING STATES AND YEAR OF EXIT

Papal States	1860
Tuscany	1860
Modena	1860
Parma	1860
Two Sicilies	1861
Hesse Electoral	1866
Hanover	1866
Saxony	1867
Hesse Grand Ducal	1867
Mecklenburg Schwerin	1867
Baden	1870
Wuerttemberg	1870
Paraguay	1870
Bavaria	1871
Peru	1880
Tunisia	1881
Egypt	1882
Korea	1905
Cuba	1906
Morocco	1911
Haiti	1915
Dominican Republic	1916
Austria-Hungary	1918
Ethiopia	1936
Austria	1938
Albania	1939
Czechoslovakia	1939
Poland	1939
Netherlands	1940
Denmark	1940
Belgium	1940
Norway	1940
Estonia	1940
Latvia	1940
Lithuania	1940
Luxemburg	1940
Greece	1941
Yugoslavia	1941
France	1942
Germany	1945
Japan	1945
Syria	1958
Zanzibar	1964
Vietnam, Republic of	1975
Yemen Arab Republic	1990
German Democratic Republic	1990
German Federal Republic	1990
Yemen People's Republic	1990
Soviet Union	1991
Czechoslovakia	1992

TABLE TWO: STATES IN EXISTENCE IN 1816 AND THEIR FATE

States Continuously in Existence Between 1816 and 1996	States in Existence in 1816 That Left the State System Once (or More) Between 1816 and 1996
Italy	Austria-Hungary
Portugal	Baden
Russia-Soviet Union-Russia	Bavaria
Spain	Denmark
Sweden	France
Switzerland	Germany
Turkey	Hesse Electoral
United Kingdom	Hesse Grand Ducal
United States of America	Netherlands
	Papal States
	Saxony
	Tuscany
	Two Sicilies
	Wuerttemberg

Furthermore, as Fazal herself notes, there are many possible definitions of state death.<sup>48</sup> Some alternative definitions would lead to a much lower state extinction rate. In terms of the status of its ability to conduct its foreign policy, for example, France perished during both the Franco-Prussian War and—twice—during World War II. Many, however, would consider the France of 2003 to be the “same” France extant in 1803. Such perceptions of continuity are not merely an acknowledgment of a nation or a culture regardless of whether the nation or culture has a state. In contrast to, say, Laplanders, the French throughout this period plainly had a state in addition to a culture, a language, and a people.

If one adopts persistence in nomenclature rather than continuous independence in foreign policy as the defining criterion of state existence, then the results change significantly from those under the CoWP definition. As Table Three shows, only twenty-one states perished permanently in name between 1816 and 1992, an extinction rate of roughly 10% rather than roughly 25%. The mergers in 1990 of what were informally called West Germany and East Germany into Germany, and of North Yemen and South Yemen into Yemen, account for roughly 20% of those disappearances. Roughly 60% of the disappearances in state names result from absorptions occurring between 1860 and 1871 in the course of German or Italian unification. The remaining disappearances are Austria-Hungary, the Republic of Vietnam, the Soviet Union, and Zanzibar.

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48. *Id.* at 318-19.

If we increase from three to seven the number of years that a state may be occupied and still survive, then state deaths also diminish significantly. A dozen states perishing during World War II under the CoWP/Fazal definition, for example, had been replaced by a state of essentially the same name by the end of 1945. Four other states returned to the international scene as independent actors of the same name within seven years of an initial extinction occurring outside the deadly confines of World War II. In fact, as Table Four demonstrates, only nine contemporary states besides Germany and Japan bear the name of a state that perished under the CoWP definition and then remained occupied, or absent from the international scene, for more than seven years.

TABLE THREE: STATES WITH NAMES NO LONGER PRESENT IN THE STATE SYSTEM (AND YEAR OF EXTINCTION)

Austria-Hungary	1918
Baden	1870
Bavaria	1871
Germany, Democratic Republic of	1990
Germany, Federal Republic of	1990
Hanover	1866
Hesse Electoral	1866
Hesse Grand Ducal	1867
Mecklenburg Schwerin	1867
Modena	1860
Papal States	1860
Parma	1860
Saxony	1867
Soviet Union	1991
Tuscany	1860
Two Sicilies	1861
Vietnam, Republic of	1975
Wuerttemberg	1870
Yemen Arab Republic	1990
Yemen People's Republic	1990
Zanzibar	1964

To the extent that, by judgment or redefinition, one interprets Fazal's analysis as reflecting relatively few state exits, and thereby as demonstrating relatively little selection pressure in the international environment, the Realist argument remains unthreatened. A judgment as to what constitutes strong selection pressure, however, is a subjective one, just as is the judgment about precisely which measure of state exit is best. A reasonable person could take Fazal's carefully constructed definition of state death—the formal loss of control over foreign policy, judged in the case of conquest by annexation or by a

TABLE FOUR: EXITS OF STATES WITH A NAME LATER PRESENT AGAIN IN INTERNATIONAL SYSTEM

State Name	Initial Exit	Re-Entrance
Albania	1939	1944
Belgium	1940	1945
Cuba	1906	1909
Czechoslovakia	1939	1945
Denmark	1940	1945
Dominican Republic	1916	1924
Egypt	1882	1937
Estonia	1940	1991
Ethiopia	1936	1941
France	1942	1944
Germany	1945	1990
Greece	1941	1944
Haiti	1915	1934
Japan	1945	1952
Latvia	1940	1991
Lithuania	1940	1991
Luxemburg	1940	1944
Morocco	1911	1956
Netherlands	1940	1945
Norway	1940	1945
Paraguay	1870	1876
Poland	1939	1945
Syria	1958	1961
Tunisia	1881	1956
Yugoslavia	1941	1944

military occupation intended to last for three or more years—and then judge the resulting extinction rates of 15% (by conquest) or 25% (from all causes) to constitute a relatively high rate of state exit. Such a result would be inconsistent with the Realists' assertion that selection pressure over long periods of time has resulted in well-adapted states by the time of the Congress of Vienna: high *current* death rates are inconsistent with a pool of highly fit organisms (at least when assuming, as the Realists implicitly do, that the environment facing states has been relatively constant).<sup>49</sup>

Realists could of course simply shift the relevant demarcation from the Congress of Vienna to the end of World War II, when the rate of state extinction dropped precipitously under almost any externally oriented measure of state

49. See *supra* Part II (discussing implicit Realist assumption of constancy in environment facing states in international relations).

death. Such a shift in the demarcation date allows the retention, *mutatis mutandis*, of the Selection Axiom in its entirety.

If one judges state extinctions between 1816 and 1992 as reflecting a high rate of state deaths, however, then the next question—and that question must remain a hypothetical one until the Realists respond to Fazal's recent research—is whether Realists will themselves abandon the Selection Axiom. Given the centrality of the Selection Axiom to Realism, and given the inventiveness of social scientists in recasting their theories in light of apparently contrary data, one might hazard that Realists will be drawn to amend, rather than to abandon, the Selection Axiom.

The path of least resistance for Realists who accept that the rate of state deaths is high would presumably be an argument that a high rate of state deaths reflects high selection pressure in the international system. The world, under this view, simply continues to be more Realist than the Realists themselves had previously assumed. This modified approach requires abandonment of the argument that the current system is highly adapted, but it does allow preservation of the argument that selection pressure is high. Furthermore, if one observes *high* rates of state death and then infers high selection pressures, the logical-indeterminacy argument advanced above in opposition to the Selection Axiom<sup>50</sup> falls by the wayside. If state death rates are newly considered by Realists to be high, then *only* an inference of *high* selection pressure will be consistent with the evidence. Realists who subscribe to a revised inference of high selection pressure, drawn from a new assumption that rates of state deaths are high, will thereby gird their intellectual loins more effectively from attack than can Realists retaining their earlier arguments; an ongoing assertion that the rate of state deaths is low, and that such a rate shows a high degree of current fitness, allows the Realists' opponents to argue, with equal plausibility, that low rates of state death simply indicate low selection pressure.

### *B. Evidence on State Births*

As we have seen in the previous section, an empirical examination of state deaths requires some elaboration, and may require some revision, of the traditional Realist view of the Selection Axiom. While high rates of state death would be inconsistent with the Selection Axiom as currently formulated, there are several ways in which Realists could argue that state death rates are not especially high or could rework their formulation of the Selection Axiom to accommodate relatively high rates of state death. Thus, empirical data suggesting high rates of state deaths may, but need not, render the Selection Axiom an unpersuasive description of international relations.

If one broadens the empirical analysis to include state births, and especially the relationship between state births and state deaths, then one finds significant evidence of a *lack* of selection pressure in the international system throughout the period since 1815. Since 1816, many more states have been created, and

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50. See *supra* Part I.

have survived, than have perished. Such a pattern of overall expansion in the population of states is clearly inconsistent with the Selection Axiom.

Under the CoWP's definitions, there were 211 state births between 1817 and 1997, with only forty-eight state deaths during the same period (see Appendix). Measured in terms of the number of states in the system, there were twenty-three states in 1816; as of 1997, there were 187. More than eight times as many states existed in 1997, therefore, as existed less than two centuries before. During that period, the ratio of births to deaths among states is greater than 5:1. Such statistics are hardly evidence for a ruthless winnowing of irrational or altruistic states. The decolonization-driven growth in states after World War II is particularly dramatic, as shown by the growth in membership of the United Nations. The UN had fifty-nine members at the end of 1950, with ninety-eight members at the end of 1960, 125 members at the end of 1970, and 151 by the end of 1980. Nor did a ruthless culling of states follow these lavish increases in their numbers. As Kahler puts it:

[T]he post-1945 international system does not appear to lend great support to a dynamic of variation and selection. Despite the birth of dozens of new and weak states, those weak states have, by and large, survived in much larger numbers than a crude evolutionary model might suggest.<sup>51</sup>

Although the post-1945 growth in states is the most dramatic, the increase in extant states in fact shows a nearly monotonic trend over the entire period covered by CoWP. From 1820 until 2000, only the decades of the 1860s and the 1930s saw more state deaths than state births.

In summary, then, many more nations were born and survive to this day than have perished. One might contrast this manifold net growth in the number of states since the Congress of Vienna with some common biological examples of theoretical fecundity. In nature, one finds mortality rates almost equal to birth rates, with huge numbers of offspring initially present that are soon winnowed dramatically by natural selection pressures to result in a steady-state population. The international environment, in contrast, exhibits birth rates far in excess of state mortality, with the result that the population of states has grown dramatically. The contrast between nature and the international environment implies that states face selection pressures almost laughably low by natural standards.

Some examples of birth rates and death rates in natural populations illustrate the dramatic differences between the natural and the international environments. *Wolffia microscopia*, which is both the smallest and the fastest-growing flowering plant on Earth, has a generation time under optimal conditions of 30 hours.<sup>52</sup> In four months of unrestrained growth, a single plant of the species could spawn enough organisms to fill a volume equivalent to that of the entire Earth.<sup>53</sup> The cabbage aphid has an average of forty-one offspring per female,

51. Kahler, *supra* note 18, at 165.

52. W.P. Armstrong, *Principles of Population Growth*, WAYNE'S WORD, at <http://waynes-word.palomar.edu/lmexer9.htm> (last visited Mar. 17, 2004).

53. *Id.*

with roughly sixteen generations per summer. One such insect, if all of its progeny were insulated from death, could produce about  $1.5 \times 10^{24}$  aphids in a summer.<sup>54</sup> The originating aphid's offspring would then outnumber the stars in the universe by several orders of magnitude. Even the ponderous reproductive processes of the elephant would, if an initial population of 10,000 animals grew at a mere 1% per year since the end of the last Ice Age, have resulted in a population of  $2 \times 10^{47}$  organisms by the present day. Such a population of pachyderms would outweigh the Earth by more than two dozen orders of magnitude.<sup>55</sup> These are only examples, but almost every plant or animal besides the higher mammals produces dozens or hundreds of times more offspring than can survive to adulthood. Indeed, the "potential exponential increase of populations (superfecundity)" is literally "Fact 1" in a prominent evolutionary biologist's schematic summary of Darwinian evolution.<sup>56</sup>

Superfecundity and a remotely steady population size together imply that death rates for offspring approach 100%: if a given pair of organisms gives rise to a huge number of offspring but only two of them are to survive (and thus replace their parents in a steady-state population), then almost all of those offspring must die. If aphids in a steady-state population produced just *one* generation a summer (instead of the sixteen that they actually do), then the death rate among aphid offspring would be roughly 95%. (Two of the forty-one offspring would survive to maintain a constant population, and  $2/41$  is approximately 5%.) Asexually reproducing organisms producing 1,000 potential offspring (in the form of eggs or seeds, for example) in a steady-state population have a death rate of 99.9%—and this assumes that such organisms have only one reproductive cycle, whereas many organisms (such as trees and fish) have both recurring reproductive cycles and significant lifespans.

In this light, even the death rate of 25% attributable to the international system if one adopts Fazal's definitions wholesale seems capable of producing only a relatively mild degree of selection pressure. Taking into account both births and deaths, after all, the net population of states has grown far more rapidly than would a steady-state population. A state born since, or extant in, 1945 is nearly certain to have survived to the present. Indeed, it is the *survival* rate, not the death rate, that we find approaching 95% in international relations after

54. MISSISSIPPI STATE UNIVERSITY, O. ORKIN INSECT ZOO, BASIC FACTS: INSECT NUMBERS *at* <http://insectzoo.msstate.edu/Students/basic.numbers.html> (citing Glenn Herrick) (last visited Mar. 17, 2004).

55. The mass of the elephant varies by type (African or Asian) and gender, but the largest combination (male African) weighs roughly 6000 ( $6 \times 10^3$ ) kilograms. See THE PHYSICS FACTBOOK, (Glenn Elert ed.) *at* <http://hypertextbook.com/facts/2003/EugeneShnayder.shtml> (last visited Nov. 15, 2004). The number of organisms ( $2 \times 10^{47}$ ) multiplied by the hypothesized weight per organism ( $6 \times 10^3$ ) yields a product of  $1.2 \times 10^{51}$  kilograms. *Id.* The mass of the earth is roughly  $6 \times 10^{24}$  kilograms. *How is the Mass of the Earth Determined*, ENCHANTED LEARNING, *at* <http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Mass.shtml>. The difference in orders of magnitude ( $51 - 24$ ) is twenty-seven. If we instead use the mass of the smallest combination of type and gender—the male Asian, about one third as massive as the male African elephant, at a mere  $2 \times 10^3$  kilograms—then the final product will be  $4 \times 10^{51}$ . The difference in orders of magnitude ( $50 - 24$ ) is twenty-six.

56. MAYR, THIS IS BIOLOGY, *supra* note 18, at 190.

World War II. In comparison to nature, the international environment seems so comparatively benign as to be essentially devoid of any selection pressures at all. Realists demonstrate an excessive faith in assuming, as the Selection Axiom does, that some analog to natural selection in the international environment will serve to ensure that states either conduct rational, egoistic foreign policies or perish.

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Evidence on state deaths has complex and at least partially ambiguous implications for the accuracy and logical coherence of the Selection Axiom. Evidence on state births, in contrast, has simple and plainly negative implications for the Selection Axiom's viability. On balance, the evidence concerning state births and deaths would seem to strike a significant, though not by itself decisive, blow against the Selection Axiom. To the degree that the Selection Axiom fails to occupy the conceptual center in theories of international relations, non-Realist theories allowing a significant role for international law can fill the resulting space. Before examining that potential role for international law in more detail, however, I evaluate the implications for the Selection Axiom of the small number of states that exist compared to the number of organisms present in the vast majority of natural populations.

#### IV.

##### THE PAUCITY OF STATES AS A THREAT TO THE SELECTION AXIOM

Examinations of state births and deaths emphasize changes in the overall population of states. The order of magnitude of the number of existing states—the rough size of the general stock, as opposed to the direction or ratios of the flows into or out of that stock—is also relevant to a systematic analysis of the Selection Axiom. In this section, I examine the evolutionary concept of “genetic drift.” Genetic drift is a probability-driven phenomenon that results in a significantly diminished role for selection pressures in small natural populations.<sup>57</sup> I argue that the application of these concepts to the international system results in a further undercutting of the Selection Axiom.

Natural populations commonly consist of tens of thousands of organisms or more. The state system, in contrast, has never had more than two hundred members, an almost trivial size compared to natural populations. Additionally, the modern era's founding population—the states extant after the Napoleonic Wars had consolidated central Europe and long before the post-colonial era led to a dramatic proliferation of states—consisted of fewer than two dozen states. Such a bottleneck is especially small even within the frame of reference of the international system, and is thus likely to be particularly influential in shaping the future of any evolutionary state system. In small natural populations, the non-selective phenomenon of “genetic drift” is likely to dominate classical selection

57. The discussion of evolutionary biology in this section relies upon RIDLEY, *supra* note 18, at 135-45, and FUTUYMA, *supra* note 18, at 297-307.



mechanisms and thus result in the demise of large numbers of characteristics that possess adaptive advantage. This is especially true of bottleneck populations. Classical selection pressures, and the adaptive characteristics that follow in their wake, are therefore much *less* likely to be the dominant force in international relations than proponents of the Selection Axiom would have us believe.

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Natural populations of larger animals almost always number in the tens of thousands, while reproductively isolated groupings of hundreds of thousands or greater would not be uncommon for insects or plants. One needs look no further than one's own gut for bacterial populations consisting of millions for a single species. The population of states, currently at a peak of roughly 200, is a far cry from the numbers present in a typical natural population. (Indeed, if a population in nature consisted of 200 individuals, then one would consider the species ultra-rare and its prospects for survival dim at best, at least absent sustained and expensive human efforts to preserve the species).<sup>58</sup>

This difference of several orders of magnitude between the size of the population of states in the international system and the size of most populations of organisms in nature is of considerable significance. The analysis that follows in this Part of the Article hinges on the fact that *natural* selection is a *large-numbers* phenomenon—often, to a first approximation, an infinite-numbers phenomenon in light of the underlying mathematics of the situation—while *international*, in other words, inter-state, relations is a *small-numbers* phenomenon. A reliable selection for genotypes of differentially fitter phenotypes can easily occur when large populations are at issue. Under these circumstances, extant organisms may well reflect the gradual evolution of fitter organisms, just as sufficiently large populations ensure the predictability, in the aggregate, of a variety of other probabilistic phenomena.<sup>59</sup> An expectation that the same phenomena will occur reliably in the highly particularized, small-numbers world of international relations, however, is more akin to an article of faith.

In evolutionary biology, “genetic drift” is a factor of special importance in small populations. Genetic drift occurs because the genetic complement of a successor generation depends not only upon the fitness of the phenotypes expressed in the predecessor generation but also, given the limitations upon the perpetuation of all alleles (variations of a gene) when parental organisms are

58. See generally DOUGLAS ADAMS & MARK CARWARDINE, *LAST CHANCE TO SEE* (1990) (reporting on authors' mixed success in finding members of ultra-rare species in nature, and generally assessing prospects for survival of such species as poor).

59. For two formulations of the “law of large numbers,” for example, see GENE R. SELLERS ET AL., *A FIRST COURSE IN STATISTICS* 162 (3rd ed. 1992) (“As the number of times that an experiment is repeated increases, the relative frequency with which an event occurs will tend to approach the theoretical probability for the event”); P.B. Stark, *The Law of Large Numbers*, at <http://stat-www.berkeley.edu/~stark/Java/ln.htm> (“in repeated, independent trials with the same probability  $p$  of success in each trial, the chance that the percentage of successes differs from the probability  $p$  by more than a fixed positive amount,  $\epsilon > 0$ , converges to zero as the number of trials  $n$  goes to infinity, for every positive  $\epsilon$ ”).

few, upon purely random factors. An example is perhaps the simplest way to tell a somewhat complex story.

Imagine the smallest possible sexually reproducing population: one male and one female. Assume that four alleles are possible with respect to a particular gene, and that two alleles at a time together determine the phenotypical expression of that gene in the organism. Assume further that, as between the two individuals, all four alleles exist. Call the alleles *a*, *b*, *c*, and *d*, and assume for the sake of convenience that the male organism possesses an *a/b* genotype and the female possesses a *c/d* genotype. Four combinations of these alleles can occur: *a/c*, *a/d*, *b/c*, and *b/d*. Assume, as is typical, that the division of diploid (two-allele) somatic cells into haploid (one-allele) gametes occurs randomly and independently. In other words, the father will pass on the *a* allele to half of his children and the *b* allele to the other half; the mother will pass on her *c* allele to half of her offspring; and which allele of the father passes to a particular child will not affect which allele of the mother passes to that same child. Taken together, these circumstances may seem elaborate and thus far-fetched, but they in fact describe a typical situation for four variations on a gene dependent for its expression on a pair of variations.

The probability that the steady-state population of two offspring from these parents will continue to have all four of the alleles originally present is only one in four.<sup>60</sup> The probability that only two alleles will be passed on to the next generation is also one in four,<sup>61</sup> with the balance of offspring pairs possessing three of the four alleles present in the parental generation. As a matter of simple statistical fluctuation, therefore, *at least* one allele will drop out of the population in 75% of generations spawned under these circumstances.

Importantly, the fitness of the eliminated allele is *irrelevant* to this process: the “selection,” if one may even call it that occurs *before any* phenotypical expression of the genotype and thus before differential fitness can play a role. Note also that the loss of the allele is effectively permanent. Only a spontaneous recurrence of whatever mutation is necessary to convert the existing allele to the vanished allele will (re-)introduce that allele into the population. Mutation rates leading to *any* change at all in an allele are typically very low,<sup>62</sup> let alone mutation rates leading to a particular change in the allele so that it reverts to a former

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60. The first offspring will have some pairing, such as *a/c*. The second offspring will have the “missing” allele from the male, that is, *b*, half of the time, and the “missing” allele from the female, that is, *d*, half of the time. The joint probability of having both the missing alleles is  $\frac{1}{2} \times \frac{1}{2}$ , or  $\frac{1}{4}$ . (The choice of the first offspring’s pairing is arbitrary.)

61. The calculation is the same as for the chance that all four alleles will be present in the next generation, but one must substitute the already-present alleles (that is, *a* and *c*) for the missing alleles used in the previous example. The answer is still  $\frac{1}{4}$ .

62. The “classical genetical ball-park figure” for the per-gene mutation rate is one in a million. RIDLEY, *supra* note 18, at 29. Ridley provides a range of more precise estimates for particular genes, while noting that there may be some selection bias in that sufficiently rare mutations are unlikely to be observed. *Id.*; see also FUTUYMA, *supra* note 18, at 271-76 (stating that mutation rates per genetic locus appear to be between 1 in 100,000 and 1 in 1,000,000, and also observing that the likelihood of *some* mutation existing in each *gamete* is relatively high given the very large number of genes in each gamete).

incarnation. An allele that is “fixed” out of the population as a result of genetic drift therefore effectively vanishes forever from the population. (One may also view this phenomenon as an irreversible “sampling error” or as the result of a “random walk” that eventually comes to rest when only one allele remains in the population at the relevant locus).<sup>63</sup> If a population is small, then genetic drift ensures that the composition of the offspring’s genotype is a result of something other than natural selection.<sup>64</sup> Such a population may grow in size in intervening years, but all subsequent generations will possess a genetic complement that depends in significant measure upon genetic drift in the past.

Obviously there are more than two states in the international system (and, as I argue below, their mode of “reproduction” bears more similarity to asexual than to sexual reproduction).<sup>65</sup> Nonetheless, the international state system is much closer in numbers to two than it is to the tens of thousands or the millions typically found in natural systems. Most phenomena associated with genetic drift are roughly linear with respect to population—that is, the average increase in genetic variation over the same number of generations will be twice as great with a population twice as large. In comparison to natural populations, the population of states is quite small. An application of evolutionary principles would therefore predict that the population of states is much more susceptible to non-fitness-related, random changes in the characteristics of states.

The effects of random, non-adaptive changes in characteristics are likely to be especially prominent in the international system because of the extremely small size of the bottleneck “founder population” extant as of the Congress of Vienna. The number of states extant prior to 1816 is not part of the CoWP data, and thus is a quantity not readily available under a definition comparable to the data from 1816 until the present. The prevalence of states with small geographical territories at the time of the Treaty of Westphalia in 1648, however, implies a relatively large number of states. Regardless, there were fewer than two dozen at the end of the Napoleonic Wars. If the analogy between natural populations and international states holds, then all variation present in modern states stems from that small number of “founder states.” The effects of random factors on a population of just two dozen or so entities can be quite profound. In natural populations of twenty, for example, the average population possessing initially maximum genetic variation will have *no* genetic variation after 200 genera-

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63. For an explanation of genetic drift employing these analogies, see FUTUYMA, *supra* note 18, at 298-300.

64. A complementary, but more empirically oriented, demonstration of the prominent role of genetic drift occurs when biologists artificially create separate populations out of a genetically identical stock and then, after raising all populations in separate but identical environments, examine the genetic composition of successor generations. Such experiments show a marked tendency for the *distribution* of genotypes across the populations to be random. A given population displays only one frequency distribution of alleles, but the *spectrum* of populations displays all possible frequency distributions. As with the examination of a small offspring generation, one can infer that the composition of a *particular* population’s genotype is a matter of chance, not the product of natural selection as a result of differential fitness. Otherwise, some particular frequency of genotypes would presumably prevail across all populations raised in identical conditions.

65. See *infra* section VI.

tions—not as a result of any adaptive differences among phenotypes, but simply as a result of the long-ago random propagation of certain alleles and the demise of others.<sup>66</sup>

The mechanics of genetic drift offer a cautionary lesson to those who would argue in favor of the Selection Axiom. The randomness of genotypes in small natural populations implies that small populations will possess characteristics determined by chance, and not by the death of those entities unfortunate enough to possess genotypes that lead them to comparatively maladaptive behavior. The small number of states in the international system, especially at the time of the (re-)“founding” of the modern state system early in the 19th century, strongly implies that the current determinants of foreign policy do *not* result from the death of states failing to conduct the rational, egoistic foreign policy touted by Realists as a state’s only reliable survival strategy.

## V.

### PUNCTUATED EQUILIBRIUM AS A THREAT TO THE SELECTION AXIOM

Two main perspectives exist on the rate of evolutionary change in nature. The “gradualist” perspective, which is of longer (or at least broader) standing in evolutionary biology, holds that the predominant force in determining whether species thrive or perish operates gradually over long periods of time.<sup>67</sup> The competing theory of “punctuated equilibrium,” associated with Niles Eldredge and Stephen Jay Gould,<sup>68</sup> holds that very intense forces of selection operate for very brief periods of time (geologically speaking), with the intervening periods characterized by mild selection pressures and few extinctions.<sup>69</sup> The theory of punctuated equilibrium provides that dramatic evolutionary changes occur around mass extinctions, with relatively little evolutionary change occurring in between.<sup>70</sup> The gradualists thus assume that, at the level of an individual species, evolution proceeds incrementally over long periods of time, while those favoring a theory of punctuated equilibrium assume that most change within a

66. FUTUYMA, *supra* note 18, at 302.

67. The question of whether Darwin himself might have advocated a theory of punctuated equilibrium is controversial. See RIDLEY, *supra* note 18, at 569. The orthodoxy in 20th-century evolutionary biology favored gradualism at least until Gould’s and Eldredge’s work in the 1970s prompted “the most lively modern controversy about evolutionary rates—the theory of punctuated equilibrium.” *Id.* at 560.

68. See Stephen Jay Gould & Niles Eldredge, *Punctuated equilibria: an alternative to phyletic gradualism*, in *MODELS IN PALEOBIOLOGY* 82 (T.J.M. Schopf ed., 1972); Stephen Jay Gould & Niles Eldredge, *Punctuated equilibria: the tempo and mode of evolution reconsidered*, 3 *PALEOBIOLOGY* 115 (1977); Stephen Jay Gould & Niles Eldredge, *Punctuated equilibrium comes of age*, 366 *NATURE* 223 (1993); Niles Eldredge & Stephen Jay Gould, *Punctuated equilibrium prevails*, 332 *NATURE* 211 (1988).

69. For a survey of scholarship consistent with the theory of punctuated equilibrium and drawn from a wide variety of fields, see Connie J.G. Gersick, *Revolutionary Change Theories: A Multi-Level Exploration of the Punctuated Equilibrium Paradigm*, 16 *ACAD. MGT. REV.* 10 (1991).

70. See generally STEPHEN JAY GOULD, *WONDERFUL LIFE: THE BURGESS SHALE AND THE NATURE OF HISTORY* (1989) (discussing dramatic winnowing in general body plans of animals occurring some time after “Cambrian explosion”).

species occurs in a concentrated (initial) phase preceding a long period of stasis.<sup>71</sup>

The difference between the two perspectives is in the end a matter of degree.<sup>72</sup> Theories of both gradualism and of punctuated equilibrium acknowledge that there have been mass extinctions during relatively short periods of time, and both theories acknowledge that selective fitness of one sort or another accounts for the survival of those species that persist through a mass extinction.

Nonetheless, the matters of degree that distinguish gradualism from punctuated equilibrium are not simply quibbles about the shape of a second-derivative function. To the gradualist, natural selection of a slow but discriminating type is the predominant mode of natural selection. Species that survive do so as a result of the gradual accumulation of adaptive traits providing small comparative advantages compared to their competitors.

To the backers of punctuated equilibrium, in contrast, the world as we see it is the result of a much more arbitrary process. Periodically, a catastrophe befalls the world, or an adaptation bursts into prominence. Huge numbers of species perish more or less at once, in geological terms. Since so many species perish, some of them may well be highly fit, while others may be poorly adapted to their pre-catastrophe environment. The post-catastrophe environment is so different from the pre-catastrophe environment that the results of long periods of pre-catastrophe evolution are nearly irrelevant. If *all* of the dinosaurs perished despite the huge variations among them, after all, then how subtle were the forces of natural selection that operated upon the finely tuned, painstakingly accumulated variety of characteristics and degrees of fitness that existed within the dinosaur family? If a huge growth in the number of mammalian species occurred in a relatively short time, with little change thereafter, then what impact does natural selection have during the millennia between catastrophes, and what impact will adaptive pressures have upon the ability of existing species to survive the next catastrophe? Once having survived a catastrophe (or having passed through the initial post-speciation phase), a macro-evolutionary group (or individual species) does not exhibit much subsequent change. Selection pressures are gigantic and arbitrary at the punctuating mass extinction; selection pressures are minimal, if still present, during the equilibria.

The debate between those favoring gradualism and those endorsing punctuated equilibrium persists in evolutionary biology largely because of the paucity of data necessary to resolve the issue. The fossil record, of course, is the pre-eminent source for data in debates involving geological time scales. That record has huge gaps in both space and time. Fossils vary immensely in completeness and quality. Many important traits—coloration, locomotion, embryological characteristics—are almost impossible to determine even with the most modern methods and the most favorable fossil record. Those who study biology

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71. The discussion of evolutionary biology in this section draws upon RIDLEY, *supra* note 18, at 557-69.

72. See *id.* at 562 ("The two theories represent extreme points in [their] continuous dimensions . . .").

must, in this area of investigation, content themselves with fragmentary evidence resistant to investigation through controlled experimentation.

Those who study international relations, in contrast, are fortunate to have before them a much less opaque and more complete record. At least if one confines one's analysis to the past few centuries, then the births and deaths of states are known almost exactly and comprehensively in both time and space. Controversies stem from differences in definition or interpretation, not from a daunting absence of data.

The pattern of state extinction reflected in the international political record of the past few centuries is much more consistent with a theory of punctuated equilibrium than of gradualism. There have been two clusters of state extinctions since the Congress of Vienna, with virtually no state extinction at other times. State extinctions cluster not only in time but also in space: outside of Europe, state death is minimal.

The extinction of the dinosaurs closely followed the impact of a huge asteroid near what is now the Yucatan Peninsula.<sup>73</sup> In international relations, the asteroids originated in Berlin. The unification of non-Austrian Germany initiated by Prussia (and the roughly contemporaneous unification of Italy) marks one period of mass state extinctions; the attempted conquest of Europe initiated by Nazi Germany led to the other.<sup>74</sup> Figure One shows the distribution of state extinctions by year during the period 1816-1996. The clustering of extinctions around 1870 and 1940 is apparent. The only years in which more than one state death occurred demonstrate, with one exception, a clustering around the 1860s and the 1940s: 1860, 1866, 1867, 1870, 1939, 1940, 1941, 1945, and 1990. No state died between 1816 and 1860; only three states died between 1872 and 1905; and only three states perished between 1946 and 1989.

Alternatively, one may examine the fates of the twenty-three states extant in 1816. Nine such states remained in (continuous) existence over the nine score years until 1997. Of those states that perished, nine died between 1860 and 1871, and four during World War II. The only outlier, Austria-Hungary, left the international system in 1918 (after a mere 480 years of life under the Hapsburgs).

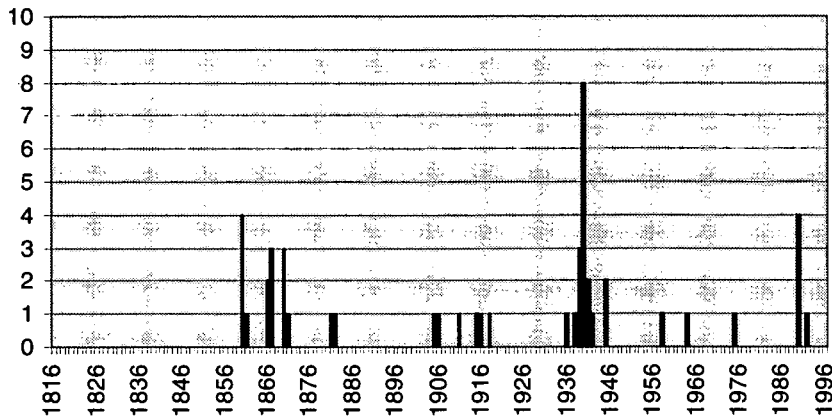
What is the implication of a punctuated equilibrium in state survivals for the Selection Axiom? In the biological case, evolution by punctuated equilibrium emphasizes the role of chance and downplays the prominence of fine-tuned natural selection operating over extended periods of time. The analogy to inter-

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73. See generally WALTER ALVAREZ, T. REX AND THE CRATER OF DOOM (1997) (describing decades-long scientific hunt for explanation of sudden extinction of dinosaurs). Some recent research implies that the impact of a single asteroid may be only a partial explanation of the dinosaurs' demise. See also Marsha Walton, *What Really Happened to the Dinosaurs?*, CNN, at <http://www.cnn.com/2004/TECH/science/03/02/coolsc.dinosaurs.extinction/index.html> (last visited Mar. 15, 2004).

74. Cf. Fazal, *supra* note 23, at 328 ("Three waves of state death—German unification, Italian unification, and World War II—stand out . . ."). If one were to include as "states" the ruling structures of aboriginal peoples in Africa, Australia, and the Western Hemisphere, then European colonization would be another such period of mass extinctions. The CoWP data do not cover this period, however.

FIGURE ONE: STATE DEATHS BY YEAR, 1816-1996



national relations, given the data, seems a close one. In the case of states, evolution by punctuated equilibrium emphasizes the role of geography and downplays the prominence of fine-tuned foreign policies. A buffer state is much likelier to perish than states blessed with a more favorable geographical position. The difficulty of developing sufficient fitness to survive in the international system extends beyond those whose geopolitical bad luck places them between the political equivalents of Scylla and Charybdis, however. France is a great power, but it fell to Germany in World War II—as did virtually every nation in continental Europe, whether by conquest or alliance. Did Switzerland and Sweden, for example, conduct their foreign policies with so much more aplomb than Belgium and Norway that the latter deservedly fell prey to German aggression while the former did not? When the Western Allies and the Soviet Union drove towards Berlin, the states created in the immediate wake of German conquest died *en masse*. It was not as if Vichy France conducted sufficiently canny diplomacy to allow itself to persist after the fall of Germany while the General Government of Poland did not. Buffer states and states near Germany were likely to meet their end regardless of the shrewdness of their foreign policy.

State deaths are concentrated not only in time but also in space: state deaths cluster tightly in Europe.<sup>75</sup> In Fazal's table of state extinctions, thirty of the forty-three extinguished states (70%) are European. To some degree, this reflects the initially disproportionate number of states that were European; out of the twenty-three states present in the international system in 1816, only the United States (and, depending on one's definition of "European," Turkey) were not European states. The initial predominance of European states fades relatively rapidly, however. As early as 1875, non-European states outnumbered

75. As discussed briefly above, *supra* note 74, a data set that included the initial wave of colonizations and counted the pre-existing governmental structures in the Americas as "states" would show another wave of mass extinctions—and this set of such extinctions, in contrast to those occurring during the CoWPs' coverage, would involve large numbers of deaths among non-European states.

European states. Of the thirty-five states that joined the international system between 1816 and 1900, only eight were European states. Of the state deaths during that period, thirteen were European states and only four were not. Thirty-two additional states entered the international system before the wave of intra-war liberations in 1944; only thirteen were European. Even before the number of non-European states mushroomed after World War II, therefore, the international system had witnessed the birth (or existence in 1816) of forty-three European states and thirty-seven non-European states. European states represented roughly 20% of the states in existence at the end of the twentieth century but account for about 40% of state extinctions since the end of World War II.<sup>76</sup>

The fact that state deaths cluster in Europe leads to an argument with the same logic that applied with respect to the clustering in time of state deaths around the 1860s and the 1940s. If state death visits a large number of European states and only a small number of non-European states, then selection pressure is high (and broad) in Europe and low elsewhere. The crucial variable is not a matter of choice made in foreign policy, but of geographical chance. After all, a European state cannot readily move to another continent, no matter how keen its attention to foreign policy.

Even in a punctuated equilibrium, of course, there is selection on *some* criterion—ability to survive in a suddenly darkened environment with huge disruptions in the pre-existing food web, or distance from Germany—that correlates with fitness in some very rough sense. Nonetheless, selection on such a criterion is *not* based upon a small comparative advantage, whether in natural adaptive fitness or in foreign policy, stemming from an accumulation over long years of advantageous factors. The existence of a dynamic of punctuated equilibrium in the international system therefore weakens the Selection Axiom.

As we saw in earlier Parts of this Article, the validity of the Selection Axiom is undermined by an indeterminate logic, by the implications of the low mortality rate in the state system, and by the implications of the tiny size of the population of states compared to natural populations. In this Part of the Article, we have seen that the veracity of the Selection Axiom is also undercut by the implications of the concentrations of state death in space and in time. Geography, not the degree to which a nation conducts a Realist foreign policy, appears to be destiny.

## VI.

### THE MODE OF STATE REPRODUCTION AS A CONTRADICTION OF THE SELECTION AXIOM

In the final Part of the Article devoted to dismantling the Selection Axiom, I begin with a question asked by evolutionary biologists: why do some organisms reproduce sexually and some reproduce asexually? I then analogize the answers to that question of evolutionary biology to the field of international relations. I conclude that, although the relevant analogies are more difficult to

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76. This calculation counts the Soviet Union as a European nation.



draw than is the case with the earlier portions of this Article, one may at least tentatively conclude that the results of the analogous inquiry in international relations are inconsistent with the implications of the Selection Axiom.

In a formulation that may strike some as appropriate even outside the realm of evolutionary biology, one author states: "The problem of sex is still more or less unsolved."<sup>77</sup> Evolutionary biologists have nonetheless both formulated the various conceptual quandaries involved with some rigor and advanced a number of testable hypotheses to account for the variation in the modes of reproduction observed in the natural world. In natural environments that change rapidly and involve complex co-evolutions of various organisms, sexual reproduction is more effective than asexual reproduction in fitting organisms to their environment.

The state system appears to be an environment of rapid change and complex interdependencies among states. Such an environment should produce states reproducing in a manner analogous to sexual reproduction. Nonetheless, state reproduction appears to bear a much closer resemblance to asexual reproduction than to sexual reproduction. The dissonance between the observed method of reproduction (analogous to asexual reproduction) and the characteristics of the international environment (which favor an analogy to sexual reproduction) is yet another reason to believe that the Selection Axiom's assertion that selective pressures significantly shape international relations is misplaced.

#### A. *The Evolutionary Biology of Modes of Reproduction*

Victory in the evolutionary struggle goes to those individuals whose genes rise in frequency in the gene pool as their progeny reproduce. An organism that requires a mate places itself at a severe disadvantage from this point of view. An animal reproducing asexually contributes roughly 100% of its genes to an offspring, while a sexual animal contributes only about 50% of its genes to the ongoing gene pool. The cost to an individual animal from sexual reproduction in evolutionary terms therefore appears, in a world where a favorable mutation typically contributes only 1% or less to increased reproductive fitness, to be almost insuperable.<sup>78</sup>

Sexual reproduction does carry one clear advantage: because sexual reproduction combines genes from two parents, it greatly accelerates the rate at which new combinations of genes can occur together. Imagine two individuals that reproduce asexually and share no alleles at a given, two-allele gene locus. Absent a mutation—an extreme rarity at an individual locus, at least measured on a generational scale<sup>79</sup>—each of the two offspring of those individuals will have gene combinations that are exactly the same as each of its respective parent organisms. Imagine instead two individuals that reproduce sexually (and with one another) and that share no alleles at a given, two-allele gene locus. *None* of

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77. RIDLEY, *supra* note 18, at 312.

78. The discussion in this and subsequent paragraphs concerning sexual and asexual reproduction draws upon RIDLEY, *supra* note 18, at 284-96, and FUTUYMA, *supra* note 18, at 606-13.

79. See RIDLEY, *supra* note 18, at 29.

the offspring will have a combination of alleles identical to its parent. A given parent can contribute only one of its alleles to its offspring, so all offspring will reflect an innovative combination of alleles at the gene locus in question. If we look a bit further down the generational road, then 25% of those in all subsequent generations will on average contain a combination present in the founding pair, while the other 75% contain one of multiple combinations not present in either founding parent.

A complementary perspective on the utility of sexual reproduction emphasizes its large comparative advantage in transmitting a favorable, dominant<sup>80</sup> mutation through a population initially in equilibrium. Among asexually reproducing organisms, the offspring of only one organism in subsequent generations will ever possess the new phenotype (unless the same mutation spontaneously arises in another organism). With sexual reproduction, in contrast, half of all the offspring in the lineage of the mutated individual will display the new phenotype, and those offspring will either yield descendants that also display the new phenotype half the time (if they outbreed with a mate) or even three-quarters of the time (if two organisms in the lineage, each possessing one dominant allele, mate with one another). A new mutation that confers a selective advantage upon its bearer can thus spread much more rapidly through a population composed of organisms reproducing sexually instead of asexually.

Under what environmental conditions, then, are organisms that pay the steep price of sexual reproduction still likely to reap a profit after one allows for the gains from more varied genetic recombination and more rapid spread of mutations through the population? The exact answer depends upon a variety of mathematical calculations and particularized assumptions, but the general answer is fairly clear: sexual reproduction is a better mode of reproduction in environments undergoing rapid change. Such change may occur as a result of factors common to all organisms living in a particular location—changes in average temperature, the availability of moisture, and so on. Rapid change may also occur—is in fact particularly likely to occur—for organisms with survival prospects intimately dependent on particular organisms of another species (as with predators and their prey). In these situations of “co-evolution,” each species improves its survival prospect at the expense of the other species, and selection pressures are strong indeed. Hell may be other people,<sup>81</sup> but the environment, hellish or at least unforgiving and rapidly changing, certainly can be other species. In such an environment, the gains to a sexually reproducing individual’s genes from the rapid genetic recombination and transmission of mutations can outweigh the high cost imposed by sexual reproduction upon passage of one’s own genes along to one’s offspring. Indeed, many evolutionary biolo-

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80. A “dominant” allele will manifest itself even in the presence of other alleles at the same gene locus. If human eye color were determined at one gene locus, and if the allele for dark eye coloring were dominant, then an individual would have dark eyes if the individual possessed at least one allele for dark eye coloring. (The individual would have light eyes only if both alleles present were the allele for light eye coloring.)

81. See JEAN PAUL SARTRE, *No Exit, in NO EXIT AND THREE OTHER PLAYS* 3, 45 (1989) (“Hell is—other people!”).

gists have posited the host-parasite relationship as the driving force behind sexual reproduction in hosts (who tend to be the more complex, more slowly reproducing member in host-parasite pairs).

*B. The Environment and "Reproduction" of States*

In attempting to apply these insights from evolutionary biology to international relations, one must answer two questions. First, do states face an environment in which change is rapid, and especially one in which complex interdependencies mimic the co-evolutionary environment present in predator-prey or host-parasite relationships? Such an environment is one in which paying the high price for sexual reproduction is likely to be profitable. Second, does the "reproductive process" of states more closely resemble sexual reproduction than it does asexual reproduction? If the answer to both questions is "yes," then states display features consistent with the extrapolated prediction of evolutionary biology: states would possess the (sexual) reproductive mode most likely to be effective in their (high-pressure) environment. The same consistency between the predictions of evolutionary biology and the practice of international relations would exist if the answer to both questions is "no," for states would then possess the (asexual) reproductive mode most likely to be effective in their (low-pressure) environment. Uniformly positive or uniformly negative answers to the questions of stress and of resemblance to sexual reproduction would therefore support the Selection Axiom as a demonstration of the proper fit between reproductive mechanism and environmental conditions.

If, in contrast, states have adopted a sexual reproductive mode in a low-pressure environment, or have adopted an asexual reproductive mode in a high-pressure environment, then there is a mismatch between the reproductive mode of states and their environment. Such a mismatch would undercut the validity of the Selection Axiom to the extent that it assumes that the international environment operates according to the principles of natural selection.

Precise answers to this pair of dichotomous questions—"do states propagate themselves in a manner analogous to sexual or asexual reproduction?" and "is the international environment simple or complex?"—are difficult to generate. The analogies are arguably strained. The conclusions of this Part of the Article are, therefore, necessarily more speculative than those of other Parts.

The character of the international environment is perhaps the easier question. Rapid change in the international environment during and after the Cold War is taken as a starting point, not a point of contention, for many analysts of international relations.<sup>82</sup> The neat bipolarity of the Cold War dissolved in just a few years, and the decade or so since has been heralded as a transition to a new, multipolar world; or to a new, information-oriented world; or to a new, economically driven world; or to a new, non-state-centric world, and so on. As one

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82. As discussed above, however, see *supra* Section II, the Realists themselves claim that international relations occurs against an essentially unchanging backdrop of competition.

might expect in a period of rapid change, there is agreement as to the magnitude of change, but disagreement as to its eventual direction.

A longer-term view of international relations—say, over the past two centuries, which is roughly the period covered by the most commonly employed database describing the inter-state environment—reveals a great deal of change as well. As the 18th century drew to a close, hereditary monarchs legitimated by divine right took to the field in wartime at the head of a small, professional army that marched to battle. They ruled European-based empires possessing far-flung colonies. They sent their orders via messengers who rode upon horses or boarded a sailing ship. The population of those European countries lived overwhelmingly in a rural environment. Traffic in horse-drawn carts connected a few urban areas inhabited by artisans and guild members. As the 20th century drew to a close, wartime presidents or prime ministers legitimated by elections remained in national capitals to command large, citizen-based armies. Empires were no more. The instructions of governments flowed to their diplomats with the speed of light in telecons, faxes, and e-mails. A nation could project military force with aircraft flying faster than the speed of sound or, in many cases, with intercontinental missiles that can span continents in minutes. Populations in European nations (and many others) live in an overwhelmingly urban environment. Traffic between huge cities flows along roads, railways, air traffic routes, and the information superhighway. The guilds are no more; labor unions waxed and then waned; communism has come and gone; socialism thrived and then sputtered; liberal capitalism, albeit liberal capitalism with labor laws and social security and central banking and an intricate system of taxation, seems to have conquered all the world.

Objective measures, as opposed to impressions, of so broad a concept as “change in the environment facing states” are of course difficult to come by. Nonetheless, the past two centuries seem likely to reflect an environment of rapid, rather than gradual, change. Furthermore, the kinds of complex interdependencies that favor sexual reproduction in a predator-prey or host-parasite relationship also appear to have (increasingly) figured in state-to-state relationships. Once, perhaps, international relations was a struggle of autarkic states pitted against one another, but now states are interdependent in a host of ways—economically most prominently, perhaps, but also culturally, environmentally and informationally. To the degree that this state-to-state interdependence mimics the selection pressures of co-evolutionary relationships across species, the international system would also favor sexual reproduction over asexual reproduction as the mechanism best suited to maintaining a population of highly fit individuals in an environment of rapid and complex change. Owing to both change and interdependence, therefore, the international environment appears to echo natural environments that favor sexual reproduction.

The next question, then, is whether states have a mode of “reproduction” that is closer to sexual reproduction or to asexual reproduction. The inquiry might be easier to conduct if the Realists had filled in their analogy to natural selection with a discussion of which (if any) aspects of international relations

and state behavior are analogous to alleles, genes, genotypes, gene pools, phenotypes, gametes, offspring, organisms, species, or generations. If one makes the assumption that individual states are analogous to the individual organisms in a population, however, then states appear to reproduce in a fashion closer to asexual than to sexual reproduction. To assume otherwise would require that one state mate with another to perpetuate itself (themselves). Of course, two states do sometimes combine, as did the Federal Republic of Germany (West Germany, in more common parlance) and the German Democratic Republic (East Germany, in more common parlance) at the end of the Cold War. This cannot be the common pattern, however, not only because we so seldom observe such mergers, but also because a population of states that reproduced only with such mergers would soon dwindle to zero. We do not observe two newly united Germanys, but one, and there is no sign—and certainly no requirement—that we are about to have two Germanys. Unidirectional change in the direction of fewer states has a predictable outcome.

If states occasionally fragmented into a large number of new states, however, then one could have a constant or rising population of states. Such fragmentations plainly occur, as with the Soviet Union and also with Yugoslavia near the end of Cold War. Perhaps this situation is akin to reproduction in organisms. Such fragmentations do not involve more than one parent state, however, and are therefore more closely analogous to asexual reproduction than to sexual propagation. The Soviet Union dissolved without the clear participation of some particular other, already-extant state, for example. Decolonization likewise increased the number of states but, also likewise, seems to have involved no necessary pairing of pre-existing states. Perhaps, in some general way, France and Great Britain are the “parent” states of the “offspring” United States (and Canada). But who sired Australia besides Great Britain, or parented Algeria besides France, or gave birth to the states of Central America besides Spain? Furthermore, those states continuously in existence since 1815, or indeed for any significant length of time, must surely have passed through the equivalent of several generations, or selection could hardly have operated at all. Yet what nation or nations regularly shared in imparting its characteristics in equal measure with, say, Great Britain?

Given that the international environment appears to be an environment of complex change and competitively interdependent interactions, the Selection Axiom would predict that states in an environment characterized by strong selection pressures would reproduce in some fashion analogous to sexual reproduction. States appear, however, to reproduce in a manner more closely analogous to asexual reproduction. The Selection Axiom’s emphasis on selective pressures in the international system therefore seems misplaced for this reason as well as for the many other reasons detailed in previous Parts of this Article.<sup>83</sup>

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83. Note, however, that if the Realists are correct in claiming that the international environment is essentially unchanging, then the correspondence of the international environment and an

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In this Part of the Article, I have presented ideas from evolutionary biology implying that sexual reproduction is the best mode of reproduction in environments with high selection pressures, while asexual reproduction is the preferred reproductive mode in low-pressure environments. I have argued that international politics displays the rapid and interdependent changes characteristic of a high-pressure environment. I have also argued that state “reproduction” occurs in a mode more closely analogous to asexual reproduction than to sexual reproduction. The mismatch between environment and mode of reproduction implies that states are *not* highly fit for their environment. This implication undercuts the explanatory force that one can reasonably attribute to the Realist’s Selection Axiom.

## VII.

### ROOM FOR LAW

This Article thus far has focused on criticizing the Selection Axiom—especially when the pre-conditions for the reliable operation of natural selection, as developed by theorists of evolutionary biology, suggest shortcomings in the assumptions and analysis of Realists promoting the Selection Axiom. In this Part, I describe briefly how international legal cooperation might fill the space opened up in international relations by a realization that the Selection Axiom does not meaningfully constrain international relations along the lines of Realist foreign policy.

At the outset, I note that vitiating the Selection Axiom leaves room in international relations not only for international legal cooperation but also for a wide variety of other phenomena and causal explanations. If states need not conduct their foreign policy with a ruthless rationality, then states could conduct their foreign policy simply as an extension of their domestic politics without the need to check their activities against the supposed realities of international politics. If survival is not a primary concern of most states, then they might use international relations as an arena in which to fight out long-standing cultural or ethnic rivalries. A state might habituate itself to a role as a moral watchdog for the world, or as a gadfly buzzing about the great powers. A state could even treat its foreign relations as a canvas on which to paint policies to be judged exclusively on the grounds of their aesthetic appeal.

I focus in this Part, however, on the potential for states to consider international legal cooperation, both as a goal of intrinsic merit and as an instrumentally useful endeavor. A wide variety of scholars and politicians have already explored or justified such a possibility,<sup>84</sup> so here I will simply sketch a variety

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asexual mode of reproduction is consistent with an environment reflecting high selection pressures. The Realist position is therefore internally consistent on this score.

84. See Setear, *supra* note 13, at 2-6 (describing scholarship in international law and international relations favorably disposed towards prospects for international cooperation); Kenneth Abbott & Duncan Snidal, *Hard and Soft Law in International Governance*, 54 INT’L ORG. 421 (2000);

of plausible arguments that one might make on behalf of foreign policies that treat international legal obligations as important, useful, or both.

States may use international law to solve a variety of collective-action problems, including the Prisoner's Dilemma that many scholars of international relations believe generally characterizes the structural difficulty facing states desiring to cooperate with one another. As with domestic contracts, parties that can reliably agree in advance upon their future behavior can optimally structure their current decisions and take best advantage of comparative competencies. International law, especially treaties, can provide clear rules and thereby a clear means of determining whether those states that promise to cooperate are living up to their promise. The treaty process also provides a variety of other rules that sharpen the payoffs and temporal boundaries of cooperation. Without these rules, an international environment filled with cross-cultural noise and the possibility of misinterpretation might blur beyond saving the potential for joint gains. International law provides a wide variety of modalities—treaties, customary law, “soft” law—from which a state may choose to signal and construct the optimal degree of commitment and cooperation.

Among nations already familiar with the rule of law as a result of its usage in their domestic polities, international law is an especially attractive tool for international cooperation. The rhetoric and obligations of law will be well known to all participants. Domestic courts, with their sophisticated apparatus of law and enforcement, will be fertile field for the implementation of international cooperative measures. Domestic bureaucracies, with their persistence in implementing the rules laid down for them and with their deference to legal standards, will also be part of the arsenal open to those seeking to effectuate international cooperation through international law. Trans-national alliances among actors at the core (or even the periphery) of the legal system can add their distinctive strength to the cooperative effort. Domestic actors can use international legal obligations to advance cooperative agendas that their domestic polities might not tolerate if the obligations at issue were not embodied in international legal promises.

One should also note that a sub-group of cooperators may prosper even in a system generally populated by hostile entities.<sup>85</sup> Conditions in the international system need not, therefore, be such that all nations adopt foreign policies respectful of international law. International law can be relevant in the study of the international system so long as even a few states find it useful to employ international law as a method of international cooperation.

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Harold Koh, *Why Do Nations Obey International Law?*, 106 *YALE L. J.* 2599 (1997); Anne-Marie Slaughter, *International Law in a World of Liberal States*, 6 *EUR. J. INT'L L.* 503 (1995).

85. See ROBERT AXELROD, *THE EVOLUTION OF COOPERATION* 64-67 (1985) (arguing that small groups of cooperative entities can prosper despite predominance of competitive behavior in system as a whole).

### VIII. CONCLUSION

An author who draws upon ideas outside a discipline to criticize conventional wisdom inside that discipline runs the risk that insiders will judge the critic to have paid insufficient attention to the rich context of the criticized discipline. Legal academics sometimes bristle at efforts to enlist the rational, materialist approach of IR theory in the service of explanations and criticisms of international law. Sociologists bridle at the idea that complex social interactions are explicable with simple models put forth by economists. Professors of literature object to the notion that mere mimicry of their deconstructions by professors of physics shows the vacuity of post-modern literary analyses (even when the mimicry is skillful enough to garner acceptance in a journal peer-reviewed by professors of literature).

This Article, however, inverts this common critique of interdisciplinary arbitrage. I do not argue that those in the outside discipline have been insufficiently sensitive to the unique richness of the inside discipline. Rather, I argue that those in the *inside* discipline have paid insufficient attention to the well-developed ideas of the *outside* discipline. If IR insiders were to pay proper attention to the logic and theory of evolutionary biology, then they would see the absurdity of arguing that a system of a few dozen states characterized by just two periods of significant selection in two hundred years could possibly bear the weight of analogy to strong and continuous Darwinian selection occurring over millennia in natural populations numbering in the millions.

Abandoning the Selection Axiom in the light of the arguments against it presented in this Article would give IR theorists free rein to postulate a wide variety of explanations for the dynamics of the international system. One such explanation is domestic politics; another, and one implicitly supported by a good deal of the analysis of this Article, is pure randomness. To scholars of international law, however, a field of explanatory constraints freed from the Selection Axiom is fertile field for explanations or justifications of international law. If states may survive while conducting a foreign policy that is not rational and egoistic, then states may survive—perhaps even thrive—while cooperating with other states through any of a variety of means, most definitely including international law. As a method of cooperation, international law has a number of advantages. International law carries with it some measure of the moral authority possessed by domestic law. International law sharpens the notion of just what behavior constitutes cooperation, as well as when plausibly to make such judgments. International law provides a well-defined set of procedures and rhetorical styles within which sovereign states can comfortably work out limitations on their sovereignty in the name of common benefits. Freed from the shackles of the Selection Axiom, states may gain a crucial means of prosperity in international law.



APPENDICES: EXITS, ENTRANCES, AND PRIOR EXISTENCES IN THE  
INTERNATIONAL SYSTEM, 1816-1992

APPENDIX A: STATES THAT HAVE NEVER SUFFERED STATE DEATH

State	Year of Birth (or, if 1816, then year of birth was earlier than 1816)
United States of America	1816
United Kingdom	1816
Switzerland	1816
Spain	1816
Portugal	1816
Italy	1816
Russia	1816
Sweden	1816
Turkey	1816
Brazil	1826
Mexico	1831
Colombia	1831
Peru	1839
Chile	1839
Venezuela	1841
Argentina	1841
Bolivia	1848
Ecuador	1854
Iran	1855
China	1860
Guatemala	1868
El Salvador	1875
Paraguay	1876
Rumania	1878
Uruguay	1882
Thailand	1887
Honduras	1899
Nicaragua	1900
Bulgaria	1908
Cuba	1909
Finland	1917
Hungary	1919
Canada	1920
Costa Rica	1920
Panama	1920
Liberia	1920

State	Year of Birth (or, if 1816, then year of birth was earlier than 1816)
South Africa	1920
Afghanistan	1920
Nepal	1920
Australia	1920
New Zealand	1920
Mongolia	1921
Ireland	1922
Dominican Republic	1924
Saudi Arabia	1927
Iraq	1932
Haiti	1934
Egypt	1937
Ethiopia	1941
Luxemburg	1944
France	1944
Albania	1944
Yugoslavia	1944
Greece	1944
Iceland	1944
Netherlands	1945
Belgium	1945
Poland	1945
Norway	1945
Denmark	1945
Lebanon	1946
Jordan	1946
Philippines	1946
India	1947
Pakistan	1947
Israel	1948
Korea, North	1948
Burma	1948
Sri Lanka	1948
Republic of China	1949
Korea, South	1949
Indonesia	1949
Libya	1951
Japan	1952
Cambodia	1953
Laos	1953

State	Year of Birth (or, if 1816, then year of birth was earlier than 1816)
Vietnam, Dem. Rep. of	1954
Austria	1955
Morocco	1956
Tunisia	1956
Sudan	1956
Ghana	1957
Malaysia	1957
Guinea	1958
Cyprus	1960
Mali	1960
Senegal	1960
Benin	1960
Mauritania	1960
Niger	1960
Ivory Coast	1960
Burkina Faso	1960
Togo	1960
Cameroun	1960
Nigeria	1960
Gabon	1960
Central African Republic	1960
Chad	1960
Congo	1960
Zaire	1960
Somalia	1960
Malagasy Republic	1960
Sierra Leone	1961
Tanzania	1961
Syria	1961
Kuwait	1961
Jamaica	1962
Trinidad and Tobago	1962
Uganda	1962
Burundi	1962
Rwanda	1962
Algeria	1962
Kenya	1963
Malta	1964
Zambia	1964
Malawi	1964

State	Year of Birth (or, if 1816, then year of birth was earlier than 1816)
Gambia	1965
Zimbabwe	1965
Maldiv Islands	1965
Singapore	1965
Barbados	1966
Guyana	1966
Lesotho	1966
Botswana	1966
Equatorial Guinea	1968
Swaziland	1968
Mauritius	1968
Fiji	1970
Bahrain	1971
Qatar	1971
United Arab Emirates	1971
Oman	1971
Bhutan	1971
Bangladesh	1972
Bahamas	1973
Grenada	1974
Guinea-Bissau	1974
Surinam	1975
Cape Verde	1975
Sao Tome-Principe	1975
Angola	1975
Mozambique	1975
Comoros	1975
Papua New Guinea	1975
Seychelles	1976
Western Samoa	1976
Djibouti	1977
Dominica	1978
Solomon Islands	1978
St. Lucia	1979
St. Vincent and the Grenadines	1979
Antigua & Barbuda	1981
Belize	1981
Vanuatu	1981
St. Kitts-Nevis	1983

State	Year of Birth (or, if 1816, then year of birth was earlier than 1816)
Brunei	1984
Liechtenstein	1990
Germany	1990
Namibia	1990
Yemen	1990
Moldova	1991
Estonia	1991
Latvia	1991
Lithuania	1991
Ukraine	1991
Belarus	1991
Armenia	1991
Georgia	1991
Azerbaijan	1991
Turkmenistan	1991
Tajikistan	1991
Kyrgyz Republic	1991
Uzbekistan	1991
Kazakhstan	1991
Marshall Islands	1991
Federated States of Micronesia	1991
San Marino	1992
Croatia	1992
Bosnia-Herzegovina	1992
Slovenia	1992

## APPENDIX B: STATES THAT DIED (AND YEAR OF REBIRTH)

State	Date of Birth	Date of Death	Date of Rebirth
Papal States	Extant in 1816	1860	None
Modena	1842	1860	None
Parma	1851	1860	None
Tuscany	Extant in 1816	1860	None
Two Sicilies	Extant in 1816	1861	None
Hanover	1838	1866	None
Hesse Electoral	Extant in 1816	1866	None
Saxony	Extant in 1816	1867	None
Hesse Grand Ducal	Extant in 1816	1867	None
Mecklenburg Schwerin	1843	1867	None
Paraguay	1846	1870	1876
Baden	Extant in 1816	1870	None
Wuerttemberg	Extant in 1816	1870	None
Bavaria	Extant in 1816	1871	None
Tunisia	1825	1881	1956
Egypt	1855	1882	1937
Korea	1887	1905	None
Cuba	1902	1906	1909
Morocco	1847	1911	1956
Haiti	1859	1915	1934
Dominican Republic	1894	1916	1924
Austria-Hungary	Extant in 1816	1918	None
Ethiopia	1898	1936	1941
Austria	1919	1938	1955
Poland	1919	1939	1945
Czechoslovakia	1918	1939	1945
Albania	1914	1939	1944
Netherlands	Extant in 1816	1940	1945
Belgium	1830	1940	1945
Luxemburg	1920	1940	1944
Estonia	1918	1940	1991
Latvia	1918	1940	1991
Lithuania	1918	1940	1991
Norway	1905	1940	1945
Denmark	Extant in 1816	1940	1945
Yugoslavia	1878	1941	1944
Greece	1828	1941	1944
France	Extant in 1816	1942	1944
Germany	Extant in 1816	1945	1990

State	Date of Birth	Date of Death	Date of Rebirth
Japan	1860	1945	1952
Syria	1946	1958	1961
Zanzibar	1963	1964	None
Vietnam, Republic of	1954	1975	None
German Federal Republic	1955	1990	None
German Democratic Republic	1954	1990	None
Yemen Arab Republic	1926	1990	None
Yemen People's Republic	1967	1990	None