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Complexity and the Analysis of Political and Social Life

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# Complexity and the Analysis of Political and Social Life

ROBERT JERVIS

When you pick up one piece of this planet, you find that, one way or another, it's attached to everything else—if you jiggle over here, something is going to wiggle over there. . . . We need this sense of the continuing interconnectedness of the system as part of the common knowledge, so that politicians feel it and believe it, and so that voters feel it and believe it, and so that kids feel it and believe it, so that they'll grow up with an ethic.

[To minimize oil spills] we should . . . mandate double-hulled vessels and compartments in tankers.—*Sylvia Earle*<sup>1</sup>

It seems obvious that if tankers had double hulls, there would be fewer oil spills. But the point of this article is that when elements constitute a system, the obvious and immediate effect might not be the dominant one. The straightforward argument compares two worlds, one with single-hulled tankers and one with double-hulled ones, holding everything else constant. But in a system, everything else will not remain constant. The shipping companies, forced to purchase more expensive tankers, might cut expenditures on other safety measures, in part because of the greater protection supplied by the double hulls. The relative cost of alternative means of transporting oil would decrease, perhaps moving spills from the seas to the areas traversed by new pipelines. But even tanker spills might not decrease. The current trade-off between costs and spills may reflect the preferences of shippers and captains, who might

<sup>1</sup> Quoted in Wallace White, "Profiles (Sylvia Earle)," *New Yorker*, 3 July 1989, 56, 46.

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take advantage of the greater safety by going faster and taking more chances.<sup>2</sup> If double hulls led to even a slight increase in the price of oil, many other consequences could follow, from greater conservation to increased uses of alternative fuels to hardship for the poor.

Although we all know that social life and politics constitute systems and that many outcomes are the unintended consequence of complex interactions, the basic ideas of systems do not come readily to mind and so often are ignored. Thus I think that readers will find that most of my specific arguments are familiar, but only as a distant echo of things that they have put aside. I believe they need to be at the center of our focus.

We are dealing with a system when a set of units or elements are interconnected so that changes in some elements or their relations produce changes in other parts of the system, and the entirety exhibits properties and behaviors that are different from those of the parts. In a system, the chains of consequences extend over time and many areas: the effects of action are always multiple. Doctors call the undesired impact of medications “side effects.” The language is misleading, for there are no criteria other than our desires that determine which effects are “main” and which are “side.” But the point reminds us that disturbing a system will produce several changes.

Garrett Hardin gets to the heart of the matter in pointing out that, contrary to many hopes and expectations, we cannot develop or find “a highly specific agent which will do only one thing. . . . *We can never do merely one thing.* Wishing to kill insects, we may put an end to the singing of birds. Wishing to ‘get there’ faster we insult our lungs with smog.”<sup>3</sup> Seeking to protect the environment by developing nonpolluting sources of electric power, we build windmills that kill hawks and eagles that fly into the blades; cleaning the water in our harbors allows the growth of mollusks and crustaceans that destroy wooden piers and bulkheads; adding redundant safety equipment makes some accidents less likely, but increases the chances of others due to the operators’ greater confidence and the interaction effects among the devices; placing a spy in the adversary’s camp not only gains valuable information, but leaves the actor vulnerable to deception if the spy is discovered; eliminating rinderpest in East Africa paved the way for canine distemper in lions, because it permitted the accumulation of cattle, which required dogs to herd them, which provided a steady source for the virus that could spread to lions; releasing fewer fine particles and chemicals into the atmosphere decreases pollution but also is likely to accelerate global warming; pesticides often destroy the crops that they are designed to save by killing the pests’ predators; removing older and dead trees from forests leads to insect epidemics and an altered pattern of regrowth; allowing the sale of an antibaldness medicine without a prescription may be dangerous, because

<sup>2</sup> For a discussion of marine safety in terms of systems effects, see Charles Perrow, *Normal Accidents* (New York: Basic Books, 1984), chap. 6. My thinking has been strongly influenced by this book.

<sup>3</sup> Garrett Hardin, “The Cybernetics of Competition,” *Perspectives in Biology and Medicine* 7 (Autumn 1963): 79–80. (Emphasis added.)

people no longer have to see a doctor, who in some cases would have determined that the loss of hair was a symptom of a more serious problem; flying small formations of planes over Hiroshima to practice dropping the atomic bomb accustomed the population to air raid warnings that turned out to be false alarms, thereby reducing the number of people who took cover on 6 August 1945.<sup>4</sup>

In politics, connections are often more idiosyncratic, but their existence guarantees that here too most actions, no matter how well targeted, will have multiple effects. For example, William Bundy was correct to worry that putting American troops into Vietnam might not make that country more secure, because deployment could not only lead the North to escalate, but also might “(1) cause the Vietnamese government and especially the army to let up [and] (2) create adverse public reactions to our whole presence on ‘white men’ and ‘like the French’ grounds.”<sup>5</sup> It seems that the American development of nuclear weapons simultaneously restrained Joseph Stalin by increasing his fear of war and made him “less cooperative and less willing to compromise, for fear of seeming weak.”<sup>6</sup> Indeed, it is now widely accepted that mutual second-strike capability not only decreased the chance of nuclear war but also made it safer for either side to engage in provocations at lower levels of violence.<sup>7</sup> Similarly, providing security guarantees to the countries of East Europe might lead them to take harsher stances toward minority ethnic groups and make fewer efforts to maintain good relations with their neighbors.

To mention three more surprising cases, in the fall of 1948, General Lucius Clay warned that American budget deficits would be seen in Europe as a fore-

<sup>4</sup> Jonathan Weisman, “Tilting At Windmills,” *Wildlife Conservation* 97 (January/February 1994): 52–57; Lindsey Gruson, “Problem With Clean Harbor: Creatures Devour Waterfront,” *New York Times*, 27 June 1993; Aaron Wildavsky, *Searching for Safety* (New Brunswick, NJ: Transaction Books, 1988); Perrow, *Normal Accidents*; the classic case of “turned” agents was revealed in J. C. Masterman, *The Double-Cross System in the War of 1939 to 1945* (New Haven: Yale University Press, 1972); Craig Packer, “Coping with a Lion Killer,” *Natural History* 105 (June 1996): 14–17; William Stevens, “Acid Rain Efforts Found to Undercut Themselves,” *New York Times*, 27 January 1994; Richard Kerr, “Study Unveils Climate Cooling Caused by Pollutant Haze,” *Science*, 12 May 1995, 802; Kerr, “It’s Official: First Glimmer of Greenhouse Warning Seen,” *ibid.*, 8 December 1995, 1565–67; Nancy Langston, *Forest Dreams, Forest Nightmares: The Paradox of Old Growth in the Inland West* (Seattle: University of Washington Press, 1995), 148–50, 292–94; “You Want Hair, Get A Prescription,” *Aspen Daily News*, 28 July 1994 (in the end, the FDA decided to permit freer sale of the medication: “Hair-Growth Drug to Be Sold Over the Counter,” *New York Times*, 13 February 1996); Leon Sigal, *Fighting to a Finish: The Politics of War Termination in the United States and Japan, 1945* (Ithaca, NY: Cornell University Press, 1988), 215–16. Those who believe that it is healthy to eat food that has not been treated with pesticides will be interested in Jane Brody, “Strong Views on Origins of Cancer,” *New York Times*, 5 July 1994.

<sup>5</sup> Quoted in Larry Berman, “Coming to Grips with Lyndon Johnson’s War,” *Diplomatic History* 17 (Fall 1993): 525.

<sup>6</sup> David Holloway, *Stalin and the Bomb* (New Haven: Yale University Press, 1994), 272.

<sup>7</sup> Glenn Snyder, “The Balance of Power and the Balance of Terror” in Paul Seabury, ed., *The Balance of Power* (San Francisco: Chandler, 1965), 184–201.

runner of inflation and so would undermine morale in West Berlin; the American pressure on the Europeans to rearm more rapidly in response to the North Korean attack on the South produced squabbles that encouraged the USSR “to believe that contradictions in the enemy camp ultimately would tear apart the enemy coalition . . . [and so] undermined U.S. bargaining power”; in 1994 the dollar strengthened after President Bill Clinton hired a powerful lawyer to defend him against charges of sexual harassment: as one currency trader put it, “we were starting to lose faith in him and that helped turn things.”<sup>8</sup>

### EMERGENT PROPERTIES

The phrase “the whole is greater than the sum of its parts” can call up images of metaphysical “holism” and organic metaphors. That is not what I have in mind. If we are dealing with a system, the whole is different from not greater than the sum of the parts.<sup>9</sup> Reductionism—seeking to understand the system by looking only at the units and their relations with each other—is not appropriate. In some cases, the concepts we apply to a system (for example, polarity) cannot be applied to the units that compose it; and in other cases, the description of a unit, such as a state being nonaligned, an actor being centrally positioned, or a person playing multiple roles, only makes sense in systemic terms. More strikingly, from the hypothetical fact that everyone in the system can have a given characteristic, we cannot infer that the system can be so described. Thus the whole may be symmetric, peaceful, or stable only if the parts are not; and a reliable system can be formed from unreliable components. This view is not an intuitive one, and many people undoubtedly would agree with Margaret Thatcher that “You get a responsible society when you get responsible individuals” or with Charles Kindleberger that “For the world economy to be stabilized, there has to be a stabilizer.”<sup>10</sup> But this simply is not true when the units interact to form a system that has quite different characteristics than they do. As James Madison put it in *The Federalist*, No. 55, “In all very numerous assemblies, of whatever characters composed, passion never fails to wrest the sceptre from reason. Had every Athenian citizen been a Socrates, every Athenian assembly would have been a mob.”<sup>11</sup>

<sup>8</sup> Walter Millis, ed., *The Forrestal Diaries* (New York: Viking, 1951), 526; William Stueck, *The Korean War* (Princeton: Princeton University Press, 1995), 6; quoted in Thomas Friedman, “It’s a Mad, Mad, Mad, Mad, World Money Market,” *New York Times*, 8 May 1994. As these examples show, people’s expectations—based in part on their beliefs about others’ expectations—are central to the dynamics of systems.

<sup>9</sup> For a good and critical discussion and review of the literature, see D. C. Phillips, *Holistic Thought in Social Science* (Stanford, CA: Stanford University Press, 1976).

<sup>10</sup> Quoted in R. W. Apple, Jr., “Margaret Thatcher: A Choice, Not an Echo,” *New York Times Magazine*, 29 April 1979, 36; Charles Kindleberger, *The World in Depression* (Berkeley: University of California Press, 1973), 305.

<sup>11</sup> *The Federalist Papers*, Isaac Kramnick, ed. (London: Penguin, 1987), 336.

This argument is not teleological: behavior rests on what individual actors do; and the dynamics of the system are rooted in their incentives, goals, and calculations. But local predictability, if not simplicity, produces a high degree of complexity and unpredictability as the outcomes and patterns are formed interactively. Moving from actors' intentions and behavior to results (and to the environment the actors face at later periods of time) is extremely difficult, in part because behavior is influenced by the actors' own estimates of the consequences of alternative courses of action. In other words, the approach outlined here has firm microfoundations despite its rejection of the reductionist claim that the system is "nothing but" individual behaviors.

### INTERCONNECTIONS

In a system, the fate of the units and their relations with others are strongly influenced by interactions at other places and at earlier periods of time. Some arrangements of connections will make a system resistant to change, and others can facilitate instability. When one element or relation cannot change unless several others do, small and slow adjustments will not be possible; each element has a veto over all the others. In international politics, the most important case is that each state might be glad to abandon a preoccupation with power and narrow self-interest if its rivals did. But for anyone to change, everyone must change, which means that power politics may exist because it exists: once it is in place, no individual state can alter it. To turn to domestic society, many experts believe that America would have a much more efficient transportation system if it relied more heavily on rail (including street cars in urban areas) and less on airplanes and automobiles. The difficulty is that such a change would require not only enormous investments of public and private capital, but also coordinated changes in private attitudes, municipal codes, tax laws, and subsidy policies. To take an example from university life, the increasing costs of books coupled with decreasing library budgets has created a crisis in many areas of scholarly publishing, as university presses cannot afford to publish many excellent monographs. An obvious alternative is to move to cheaper electronic forms of dissemination for books that contain important scholarship but will never attract many buyers. But doing so would require large and almost simultaneous adjustments of policies and attitudes on the part of such disparate but interrelated actors as publishers, libraries, individual scholars, departmental hiring committees, and the authorities that grant tenure.

### INTERACTIONS, NOT ADDITIVITY

We cannot understand systems by summing the characteristics of the parts of the bilateral relations between pairs of them.<sup>12</sup> This is not to say that such opera-

<sup>12</sup> Kenneth Waltz, *Theory of International Politics* (Reading, MA: Addison-Wesley, 1979), 64; for parallel discussions in social psychology, organization theory, and ecology, see respectively Paul Watzlawick, Janet Beavin, and Don Jackson, *Pragmatics of Human Communication: A Study of Inter-*

tions are never legitimate, but only that when they are, we are not dealing with a system. More precisely, actions often interact to produce results that cannot be comprehended by linear models. “Linearity involves two propositions: 1) changes in system output are proportional to changes in input . . . and 2) system outputs corresponding to the sum of two inputs are equal to the sum of the outputs arising from the individual inputs.”<sup>13</sup>

Intuitively, we often expect linear relationships. If a little foreign aid slightly increases economic growth, then more aid should produce greater growth. But in a system, a variable may operate through a nonlinear function. That is, it may have a disproportionate impact at one end of its range. Sometimes even a small amount of the variable can do a great deal of work; and then the law of diminishing returns sets in, as is often the case for the role of catalysts. In other cases, very little impact is felt until a critical mass is assembled. For example, women may thrive in a profession only after there are enough of them so that they do not feel like strangers.<sup>14</sup> Similarly, the effect of one variable or characteristic can depend on which others are present. Thus even if it is true that democracies do not fight each other in a world where other regimes exist, it would not follow that an entirely democratic world would necessarily be a peaceful one: democracies might now be united by opposition to or the desire to be different from autocracies and once triumphant might turn on each other. The other side of this coin is that many of the characteristics of democracies that classical Realists saw as undermining their ability to conduct foreign policy—the tendency to compromise, heed public opinion, and assume others are reasonable—may serve them well when most of their interactions are with other democracies.

Nonlinearities create problems with the classic conservative argument that changes should proceed only incrementally: “By a slow but well-sustained progress, the effect of each step is watched; the good or ill success of the first gives light to us in the second; and so, from light to light, we are conducted safely through the whole series.”<sup>15</sup> But this prescription ignores several facts: jumps rather than smooth progressions often characterize operations of systems; some goals can only be reached by quick and drastic changes; the direct response to a small alteration in a policy or input may tell us very little about either the delayed effects or those that would follow from a large change.

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*actional Patterns, Pathologies, and Paradoxes* (New York: Norton, 1967), 125–26, 135–39; Perrow, *Normal Accidents*; Stuart Pimm, *The Balance of Nature? Ecological Issues in the Conservation of Species and Communities* (Chicago: University of Chicago Press, 1991), 249–56.

<sup>13</sup> Alan Beyerchen, “Nonlinear Science and the Unfolding of a New Intellectual Vision” in Richard Bjornson and Marilyn Waldman, eds., *Papers in Comparative Studies* vol. 6 (Columbus: Center for Comparative Studies in the Humanities, Ohio State University Press, 1989), 30.

<sup>14</sup> Gerhard Sonnert with the assistance of Gerald Holton, *Gender Differences in Science Careers* (New Brunswick, NJ: Rutgers University Press, 1995).

<sup>15</sup> Edmund Burke, *Reflections on the Revolution in France* (New York: Everyman’s Library, 1967), 19–20.

Not only does the effect of one variable frequently depend on the state of another and the success of one strategy depend on the strategies that others are following, but initial behaviors and outcomes often influence later ones, producing powerful dynamics that explain change over time and that cannot be captured by labeling one set of elements “causes” and other “effects.” Although learning and thinking play a large role in political and social life, they are not necessary for this kind of temporal interaction, which characterizes the operation of evolution in nature. We usually think of individuals and species competing with one another within the environment, thus driving evolution through natural selection. In fact, there is coevolution: plants and animals not only adapt to the environment, they change it. As a result, the environment becomes more hospitable to some life forms and less hospitable to others.

Nature is not likely to settle down to a steady state, as the development or growth of any life form will consume and be consumed by others, closing some ecological niches and opening others, which in turn will set off further changes. To some extent, organisms create their own environments, not only by direct actions (such as digging burrows, storing food, excreting waste products), but as their very existence alters the microclimates, nutrients, and feeding opportunities that will affect them and others. To take a more readily visible example, elephants thrive on acacia trees. But the trees can only develop in the absence of the elephants. After a while, the elephants destroy the trees, drastically changing the wildlife that the area can sustain and even affecting the physical shape of the land. In the process, they render the area uncongenial to themselves, and they either die or move on. The land is adapting to the elephants just as they are to it. One Masai put it well: “Cows grow trees, elephants grow grasslands.”<sup>16</sup> Most consequentially, the very atmosphere that supports current life was produced by earlier forms, many of which could not survive in the new environment: long before humans, species of bacteria were so successful and generated so much pollution that they poisoned themselves.

Politics, like nature, rarely settles down as each dispute, policy, or action affects others and reshapes the political landscape, inhibiting some behaviors and enabling others. Campaign financing reforms generated new actors in the form of political action committees (PACs), new issues in the form of arguments about what PAC activities should be permitted, new debates about the meaning of the first amendment, and new groups that track the flow of money and services. These in turn affect not only how funds are solicited and given, but also change the allies and adversaries that are available to political actors and the ways in which a variety of other issues are thought of. Political maneuvers create niches for new actors and disputes, often in ways that no one had anticipated. William Miller’s fascinating study of the southern attempt to con-

<sup>16</sup> Quoted in David Western, “The Balance of Nature,” *Wildlife Conservation* 96 (March/April 1993): 54. For more technical discussions, see Roger Lewin, “In Ecology, Change Brings Stability,” *Science*, 28 November 1986, 1071–73; and S. J. McNaughton, R. W. Ruess, and S. W. Seagle, “Large Mammals and Process Dynamics in African Ecosystems,” *BioScience* 38 (December 1988): 794–800.

trol—indeed choke off—the debate about slavery in the 1830s points out that by passing a gag rule prohibiting congressional discussion of petitions asking for the end of the slave trade in the District of Columbia, the South called up “petitions against the gag rule itself” and made a new issue of the right to petition the government.<sup>17</sup> Indeed, many protest movements grow as people previously unsympathetic are offended by the way the authorities respond. Each added issue may mobilize the population in a different way than did the original one. And of course the new dispute in turn changes the political environment.

The capabilities, preferences, and beliefs of actors can also be changed by interaction. Conflict often hardens attitudes and drives people to extreme positions in addition to mobilizing those who had not been previously involved. Thus the Supreme Court’s ruling that school segregation was illegal both drove southern politics to the right and helped build the civil rights movement, developments that in turn led to demonstrations and violence, which greatly increased the pressure for civil rights legislation.<sup>18</sup> Just as conflict spirals can be understood as changing the environment in which each actor finds himself and which his behavior creates, so biologists stress that the environment of each species includes others with which it interacts, which is why we should not be surprised that coevolutionary processes include arms races between predators and prey.<sup>19</sup>

It is clear that for better and for worse people change as they are affected by experiences, including those that they have chosen. Personal development does not mean that the person simply turns into what was latent in him. Instead, we need to take account of the situations in which he was placed. Some examples are familiar to academics. When we think about whether one of our bright undergraduates would do well in a Ph.D. program, we are likely to ask whether she enjoys and does well at independent research. But the right question may be whether she will enjoy and do well at it after she has experienced two or three years of graduate school. It is also a mistake to point to the lackluster career of a person who failed to get into a major graduate school or to receive tenure at a top school as justification for these decisions, because we do not know how well she would have done in a more stimulating and demanding setting. Similarly, only transforming interactions can explain why on this sunny Sunday afternoon I am not only revising this article, but enjoying the effort:

<sup>17</sup> William Lee Miller, *Arguing About Slavery* (New York: Knopf, 1996), 278. The classic treatments of these processes are E. E. Schattschneider, *Politics, Pressures and the Tariff* (New York: Prentice-Hall, 1935); and Schattschneider, *The Semisovereign People* (New York: Holt, Rinehart, and Winston, 1960); also see Norton Long, “The Local Community as an Ecology of Games,” *American Journal of Sociology* 44 (November 1958): 251–61; and George Tsebelis, *Nested Games: Rational Choice in Comparative Politics* (Berkeley: University of California Press, 1990).

<sup>18</sup> Michael Klarman, “How *Brown* Changed Race Relations: The Backlash Thesis,” *Journal of American History* 81 (June 1994): 81–118.

<sup>19</sup> R. Dawkins and J. Krebs, “Arms Races Between and Within Species,” *Proceedings of the Royal Society, London*, vol. B 205, 21 September 1979, 489–511; Leigh Van Valen, “A New Evolutionary Theory,” *Evolutionary Theory* 1 (July 1973): 1–30.

forty years ago I had quite different activities in mind. In a marriage, one partner sometime wonders about what would have happened had she married someone else. Hearing this, her husband is likely to become upset, thinking she might have preferred someone else to him. But this is not the point: with a different spouse, she might have been quite a different person with different preferences. Indeed, one cannot readily ask which husband or life “she” would prefer because there is no single individual who could make this choice. Similar reasoning explains the limitations of the common argument that international institutions do not matter, because states will ignore them when push comes to shove and vital interests are at stake. Although the statement is correct, it misses the role institutions can play in shaping interests and in seeing that push does not come to shove.

Many statesmen fail to see how their behavior will change their environments. Like good linear social scientists, they understand that their actions can produce a desired outcome, all other things being equal, and project into the future the maintenance of the conditions that their behavior will in fact undermine. This in part explains the Argentine calculations preceding the seizure of the Falklands/Malvinas. Their leaders could see that Britain’s ability to protect its position was waning, as evinced by the declining naval presence, and that Argentina’s claim to the islands had received widespread international support. But what they neglected was the likelihood that the invasion would alter these facts, unifying British opinion against accepting humiliation and changing the issue for international audiences from the illegitimacy of colonialism to the illegitimacy of the use of force.<sup>20</sup> A similar neglect of the transformative power of action may explain why Saddam Hussein thought he could conquer Kuwait. Even if the United States wanted to intervene, it could do so only with the support and cooperation of other Arab countries, which had sympathized with Iraq’s claims and urged American restraint. But the invasion of Kuwait drastically increased the Arabs’ perception of threat and so altered their stance. Furthermore, their willingness to give credence to Iraqi promises was destroyed by the deception that had enabled the invasion to take everyone by surprise.

The failure to appreciate the fact that the behavior of the actors is in part responsible for the environment, which then impinges on them, can lead observers—and actors as well—to underestimate actors’ influence. Thus states caught in a conflict spiral believe that they have little choice but to respond in kind to the adversary’s hostility. This may be true, but it may have been the states’ earlier behavior that generated the situation that now is compelling. That the current environment may have been in part created by the actor without his knowing it, is the burden of Lewis Dexter’s analysis of members of Congress and lobbyists:

<sup>20</sup> Lawrence Freedman and Virginia Gamba-Stonehouse, *Signals of War: The Falklands Conflict of 1982* (Princeton: Princeton University Press, 1991), 14–15.

A congressman very largely gets back what he puts out. In his limited time, he associates more with some kinds of people than with others, listens to some kinds of messages more than to others, and as a result hears from some kinds of people more than from others. He controls what he hears both by his attention and by his attitudes. He makes the world to which he thinks he is responding. Congressmen, indeed, do respond to pressures, but they generate the pressures they feel.<sup>21</sup>

Robert McNamara complains about how he was misled by faulty military reporting but similarly fails to consider whether his style and pressure might have contributed to what he was being told. Lawrence Tribe more perceptively argues that recent Supreme Court decisions that deny the appropriateness of judicial remedies for “private” wrongs are in error, because they similarly neglect the role of laws, courts, and the state in generating the forces that brought about the problems.<sup>22</sup> More cunning actors are able to reach their goals by manipulating their environment so that it changes in a way that enables or requires them to reach their goals.

These kinds of interactions explain much of the otherwise puzzling behavior to which we will now turn: intentions and outcomes often are very different, regulation is prone to misfire, and our standard methodologies are not likely to capture the dynamics at work.

### OUTCOMES DO NOT FOLLOW FROM INTENTIONS

In a system, actions have unintended effects on the actor, others, and the system as a whole, which means that one cannot infer results from desires and expectations and vice versa. The most obvious reason for this is competition. As actors seek advantage and try to out-strategize each other, some of them—if not all—must be surprised. But competition is not necessary for many consequences to be unintended, because the phenomenon is a basic product of complex interconnections. Indeed, interventions to ameliorate natural disasters can increase their damage. Competition also was peripheral to the reasons why the Reagan administration’s population control program that aimed at decreasing abortions in the Third World probably increased them. Cutting off funds to organizations that performed abortions indeed put many of them out of business. But since they also provided birth control supplies and many of the people previously served did not go elsewhere, unwanted pregnancies and abortions increased.<sup>23</sup> More obviously, laws that mandate life imprisonment for the third felony convictions can increase violent crime by those who have been convicted twice and decrease the proportion of those who are willing to plea-bargain. In

<sup>21</sup> Raymond Bauer, Ithiel de Sola Pool, and Lewis Anthony Dexter, *American Business and Public Policy* (New York: Atherton, 1963), 420.

<sup>22</sup> Lawrence Tribe, “The Curvature of Constitutional Space: What Lawyers Can Learn From Modern Physics,” *Harvard Law Review* 103 (November 1989): 1–39.

<sup>23</sup> Constance Holden, “U.S. Abortion Policy May Increase Abortions,” *Science*, 27 November 1987, 1222.

international politics, not only are the expectations of states often thwarted by the actions of others, but many outcomes are mutually undesired: thus it is not correct to claim that “the absence of superpower war is puzzling only if at least one of the superpowers was expansionist and aggressive.”<sup>24</sup>

It might seem that unintended consequences would not arise when we deal directly with the actor, for example, by increasing the resources at his disposal. But good samaritans have found that people may not respond to such interventions by increasing the valued activities, as they would in a linear world. One reason for the failure of massive intervention to assist children who were at risk for delinquency and unemployment may be that families in the program substituted it for the use of friends, clergy, and others to whom they otherwise would have turned.<sup>25</sup> Similarly, if foreign aid allows a poor country to procure the essentials of government without developing a powerful state to guide and extract resources from its society, the result will be decreased effectiveness, lower rates of economic growth, and instability. In a parallel manner, states may decrease their efforts in support of a common cause when their allies do more. As these cases show, when the values and objectives of those receiving assistance differ from those providing it, the behavior of the former may also diverge from what the latter intended.

These problems cannot be avoided by giving people simple incentives and orders. In fact, these easily misfire, not because people disregard them, but because following them leads to behavior that is not what was wanted. Thus centrally planned economies failed because orders were obeyed too well: having been told to maximize production, factories rationally turned out a high volume of shoddy goods with great waste; having been given incentives for production with minimum waste, clothing factories produced nothing but large sizes.<sup>26</sup> While at first glance the ability to direct behavior would seem to lead to perfect control, it simply is not possible to design incentives that can guide people through a multitude of unforeseen situations in a way that is desired by those establishing the rules. Thus a welfare reform typical of the 1990s gives a flat rate to agencies for placing foster children in homes rather than paying a certain amount for each day the child is in its care. The admirable objective is to give the agency incentives to resolve the child’s future as quickly as possible; the danger is that speed rather than the child’s best interests will guide the agency’s behavior.<sup>27</sup> Even more disturbingly, it appears that laws designed to deter ille-

<sup>24</sup> Richard Ned Lebow and Janice Gross Stein, *We All Lost the Cold War* (Princeton: Princeton University Press, 1994), 357.

<sup>25</sup> Lee Ross and Richard Nisbett, *The Person and Situation: Perspectives of Social Psychology* (New York: McGraw-Hill, 1991), 214–19. Of course, other factors may have been at work as well, such as the children and their families developing low self-images and expectations of failure.

<sup>26</sup> The classic study is Joseph Berliner, *Factory and Manager in the USSR* (Cambridge, MA: Harvard University Press, 1957).

<sup>27</sup> Kimberly McLarin, “Foster Care Model Attracts New York—But Only in Part,” *New York Times*, 20 November 1995; for the perverse effects on foster care created by the new welfare incentives, see Nina Bernstein, “Foster Care System Wary of Welfare Cuts,” *ibid.*, 19 November 1995.

gal immigration by holding ships' crews accountable for anyone they bring to port have led them to murder stowaways.<sup>28</sup>

Overlapping with these processes, problems are created when the effects of incentives cannot be limited to the target population. Most obviously, ameliorating the plight of unfortunates may make it worthwhile for others to assume that status. Supply creates its own demand in what economists call the "moral hazard" problem, as people who know that they will be helped if they are in need will not struggle as hard to avoid this outcome. For example, supplying housing to the homeless or even improving shelters leads some people who are housed dreadfully to abandon their accommodations; giving first priority for housing to those living in unsafe conditions provides incentives for people to temporarily move into such quarters; decent welfare payments make it monetarily irrational to take low-paying jobs. People then respond to orders and incentives, but the results are not what was intended, because in a system you cannot do just one thing.

Unintended consequences need not be undesired. Indeed, economic growth may fit in this category, springing from the psychological tensions of Protestantism and sustained by the desire of individuals to enrich themselves, which, although usually unsuccessful, enriches society through the operation of Adam Smith's invisible hand. To take a specific example from international politics, Anwar Sadat's trip to Jerusalem, which was applauded by President Jimmy Carter and most Americans, was at least in part motivated by the Egyptian leader's desire to derail the Soviet-American joint communique calling for a Geneva meeting with a significant role for the Soviet Union. Carter may also have benefited from the unintended consequences of his pledge to remove American troops from Korea. Although he soon backed away from it, the anxiety it created brought Japan and Korea closer together.<sup>29</sup>

## REGULATION

When governments seek to restrain undesired behavior through laws and regulation, the results are often unintended. The problem is not so much that laws are difficult to enforce, but once more that in a system we can never do merely one thing. When the British government was considering traffic regulations in the 1930s, the secretary of the Cyclists' Touring Club argued that "if rear lamps became compulsory on bicycles the mortality among cyclists would immediately go up enormously," because people who were driving at night would expect to see the bicyclists more easily and so would drive faster and hit more of them, especially those whose lights had gone out.<sup>30</sup> Although this argument seems so far-fetched as to discredit systems thinking, it turns out to have a sig-

<sup>28</sup> "Did a Taiwan Ship Hurl Stowaways Overboard?" *ibid.*, 29 May 1996.

<sup>29</sup> Victor Cha, *Alignment Despite Antagonism: The United States-Korea-Japan Security Triangle* (Stanford, CA: Stanford University Press, forthcoming).

<sup>30</sup> William Plowden, *The Motorcar and Politics: 1896-1970* (London: Bodley Head, 1971), 241.

nificant measure of truth. John Conybeare found that when seat belts were made mandatory in Australia, deaths and injuries declined for the occupants of automobiles but went up for pedestrians.<sup>31</sup> In a classic study, Samuel Peltzman argued that safety devices like seat belts and energy-absorbing steering columns did not produce the expected effects, because drivers, knowing that they had a greater margin of safety, drove faster and less carefully.<sup>32</sup> This offsetting behavior leads to what can be called the Titanic effect, after the ship whose captain took fewer precautions because he felt that he had such a great margin of safety that it made sense to reduce it slightly in order to make a speedier trip. People who are given resources may use them for their own purposes, which may not be those of the people who established the regulations.

While regulators believe that controlling one element will allow them to change behavior as desired, in fact this would be the case only if everything else in the system were constrained. But usually it is not. Thus we should not be surprised that the attempt to protect civil liberties by limiting police behavior (for example, by excluding evidence gathered in violation of the fourth amendment) created new and undesired practices, such as police perjury about how they found the evidence. As Gary Marx explains: “restrict police use of coercion, and the use of deception increases. Restrict investigative behavior after an offense, and increased attention will be paid to anticipating an offense.”<sup>33</sup> Because criminals also react to changes in their environments, a drastic increase in car-jacking in Nairobi, Kenya followed the introduction of measures to prevent the more normal form of car theft: “As insurance companies insisted that their clients install car alarms and electronic devices that can immobilize engines, it made more sense to just steal the car when in motion.”<sup>34</sup> In a related dynamic, civilian attempts to gain control of the military by means of detailed orders may erode its professionalism and faith in the civilian leadership, thereby making it less responsive to civilian goals and commands than it was before.<sup>35</sup>

The most extreme argument is that regulation is always futile or counter-productive:<sup>36</sup> one cannot improve on market-driven outcomes; order can arise

<sup>31</sup> John Conybeare, “Evaluation of Automobile Safety Regulations: The Case of Compulsory Seat Belt Legislation in Australia,” *Policy Sciences* 12 (June 1980): 27–39.

<sup>32</sup> Samuel Peltzman, “The Effects of Automobile Safety Regulation,” *Journal of Political Economy* 83 (August 1975): 677–725. The empirical analyses necessary to tease out the influence of regulations from the multiplicity of other factors at work is extremely difficult, and so the studies are controversial.

<sup>33</sup> Gary Marx, *Undercover: Police Surveillance in America* (Berkeley: University of California Press, 1988), 47.

<sup>34</sup> Donatella Lorch, “In Nairobi, Car-Jacking is a Bitter Fact of Life,” *New York Times*, 19 December 1993; similarly, it is now generally believed that harsh sentences for drug dealers greatly increased the number of teenagers in the drug trade.

<sup>35</sup> This analysis is drawn from Samuel Huntington, *The Soldier and the State* (Cambridge, MA: Harvard University Press, 1957); and Peter Feaver, *Guarding the Guardians: Civilian Control of Nuclear Weapons in the United States* (Ithaca, NY: Cornell University Press, 1992), esp. 251–53.

<sup>36</sup> As Albert Hirschman notes, although the “futility thesis” and the “perversity thesis” are often conjoined, they actually represent quite different beliefs about the ways in which systems defeat at-

spontaneously; the best outcomes for society will be the resultants of separate decisions by individuals who are focused on their own interests rather than the product of benign rulers seeking the common interest. Following this line of reasoning, the Bush administration sought to have occupational health regulations incorporate second-order effects on the grounds that by increasing the costs to business, the new rules could lead them to cut wages or fire workers, which in turn would endanger their health: “better-off workers tended to use their higher wages for more leisure, more nutritious food and more preventative health care, as well as extending their longevity by smoking and drinking less than former workers.”<sup>37</sup>

But this rejection of regulation pretends to more precision than is possible. While the complexity of the interconnections means that we cannot be certain that the proposed rules will work (indeed, even after the fact it would be extremely difficult to tell), neither can we be confident that the dire predictions are correct. To claim that we can be certain of how each actor will respond, how the different behaviors will interact, and how people will then adjust to the changed circumstances goes beyond the knowledge we can have. On the other hand, it is also an error to stop the analysis too soon and look only at direct effects. Thus the same people who supported Bush’s calculation of the indirect effects of health regulations argued that only unfounded speculation could lead one to conclude that cutting welfare would push children into poverty or that reducing college loans would force many students to drop out.

### IMPLICATIONS FOR TESTING AND METHOD

It is common to test the validity of propositions by making comparisons between two situations that are identical except for one variable. When we are dealing with systems, however, things cannot change one at a time; everything else cannot be held constant. To try to estimate the role of one element or action, we have to understand complex interactions, and these present a series of challenges to standard comparative methods.

A biologist objected to the movie *Arachnophobia* on the grounds that without spiders we would be overwhelmed by insects.<sup>38</sup> This prediction is certainly correct if spiders were to disappear and everything else remained constant. But in a system it would not, and the claim shows the perils of using the *ceteris paribus* assumption. Although even experts cannot predict what a spiderless world would be like, even a nonexpert can say that in the absence of one of the insects’ prime predators, other kinds would flourish, and the world would be

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tempts to alter them. See Hirschman, *The Rhetoric of Reaction* (Cambridge, MA: Harvard University Press, 1991), 71–74.

<sup>37</sup> Robert Hershey, Jr., “Citing Cost, Budget Office Blocks Work Place Health Proposal,” *New York Times*, 16 March 1992; also see Adam Clymer, “Budget Office Retreats on Work Health,” *ibid.*, 30 March 1992.

<sup>38</sup> “Spider Expert Accuses Hollywood of Spinning Web of Deceit,” *Aspen Daily News*, 26 July 1990.

different in many ways. In the end, perhaps life would be much worse for human beings (although it also could be better), but the simple extrapolation is inappropriate. Similarly flawed are the standard recitations of how many jobs are at stake in trade disputes: knowing how many people are producing exports to a country does not tell us how many jobs would be lost if trade were restricted, because the consequences would be multiple, including some that would increase employment, most obviously the demand for products previously imported from the other country.

When two elements interact, we will be misled if we sum up the impact that each factor would have were it to act by itself. During the interwar period the British Royal Navy underestimated the threat posed by air power to battleships by looking at each mode of attack separately—for example, torpedoes, high-altitude bombing, dive bombing—without taking into account either the fact that the damage from one attack would reduce the ship's ability to cope with subsequent ones or that the tactics appropriate to deal with one threat would increase vulnerability to others.<sup>39</sup> To take a larger-scale example, although British strategists tended to debate the merits of two types of grand strategy—using continental allies and relying on sea power—as alternatives, in fact the latter worked so well because it was combined with the former: as Paul Kennedy has shown, without a continental enemy, Britain's adversary would be free to pour resources into a navy and defeat Britain at sea.<sup>40</sup>

We also need to track the circular processes at work as actors respond to changes in their environments, which are in part a product of what they and others did earlier. In thought experiments we often ask what would have happened if one element in our world were different. Living in New York, I hear people speculate that traffic would be unbearable (as opposed to merely terrible) had Robert Moses not built his highways, bridges, and tunnels. But estimates cannot merely subtract these structures from today's Manhattan landscape. The traffic patterns, the location of businesses and residences, and the number of automobiles now on the streets are in significant measure the product of Moses's road network. Had it not been built, or had it been built differently, many other things would have been different. Traffic might now be worse, but it might also be better if a more efficient public transportation system had developed. Alternatively, traffic might be light because the city would not have grown so large and prosperous. In any event, the thought experiment cannot be carried out in a simple way.

Because systemic outcomes are the product of the interaction of multiple factors, a common sense method of probing the environment cannot be trusted. It seems obvious that we could try several tactics and adopt the one that works best. But the possibility that adversaries could learn to thwart the tactic is not

<sup>39</sup> Geoffrey Till, "Air Power and the Battleship in the 1920s" in Brian Ranft, ed., *Technical Change and British Naval Policy: 1860–1939* (New York: Holmes and Meier, 1977), 119.

<sup>40</sup> Paul Kennedy, *The Rise and Fall of British Naval Mastery* (London: Macmillan, 1983).

the only problem. Unless the areas are completely isolated, the tactic's success could be attributable to the entire ensemble that had been employed: the use of those that had apparently failed might have been necessary for the success of the others. In Vietnam, critics argued for shifting resources from large search-and-destroy operations, which had yielded few results, to the pacification program, which had established government control where it was put in place. But the army's reply may have been valid: pacification worked only because conventional offenses contained the enemy's most effective forces, which would destroy the program if American policy changed. More recently, the costs of medical care have been growing more slowly under private plans than under Medicare. This does not mean the success could be duplicated, however. Not only may the two populations have different characteristics, but the private plans have been able to use their bargaining power with doctors and hospitals to pay them less, forcing them to recoup their expenses by charging Medicare more.<sup>41</sup>

Many policy prescriptions are flawed by the nonsystemic assumption that the new course of action will leave untouched the environment with which it interacts: an actor sees that an action will be in his interest, all other things being equal, and neglects the fact that the adversary is likely to react, and so things are not likely to remain equal. For example, if we were not in a system, then lifting the arms embargo on Bosnia during the recent war would have strengthened that state. But Serbia and Croatia probably would have reacted by buying more arms and increasing their aggression. For the same reasons, tactics or exogenous changes that increase an actor's incentives to stand firm in bargaining may not increase the ability to prevail if the other's incentives are symmetrically increased as well. An adversary will gain more in terms of reputation by defeating a state that has committed itself to its position than it will if the state has not done so, for example.

Testing the validity of propositions is difficult in a system, because we cannot readily hold all other factors constant when the variable on which we are focusing influences the composition of the set of cases we are studying. While this phenomenon is most obvious when actors' calculations are involved, all that is required is for elements to be interconnected in a way that undercuts straightforward comparisons. Take, for example, the claim by Richard Lewontin, a noted biologist who usually thinks in systemic terms: "Scientific medicine has done little to add years to people who have already reached their maturity. In the last 50 years only about four months have been added to the expected lifespan of the person who is already 60 years old."<sup>42</sup> But the reasoning is incorrect, because the world that modern medicine has helped to shape is a very different one from that which existed earlier. Lewontin's data refer only to

<sup>41</sup> This point is missed, for example, in Milt Freudenheim, "Medicare, Jot This Down," *New York Times*, 31 May 1995, which moves from the basic facts to the conclusion that "business has a lot to teach the Government about controlling medical costs."

<sup>42</sup> Richard Lewontin, *Biology as Ideology* (New York: HarperCollins, 1993), 42–43.

those who live past 60, and if health science has saved people who otherwise would have died young—people who are not as strong and healthy as others—then the fact that life expectancy after 60 has grown a bit indicates, not the weakness of modern medicine, but its potency.

The situation poses more hurdles for testing propositions when at least one actor calculates the expected impact of the variable in question. To extend the example in the previous paragraph, people may engage in more health-threatening activities because of their faith in the health system, in which case medicine would have heightened the challenges it faces and any increase in life expectancy would show that health care had improved greatly. To put this in the terms used earlier, the validity of obvious tests is undermined by the ability of people to use resources for their own purposes, which may differ from those who provided them. Thus Richard McKenzie and Gordon Tullock note that if we introduced a new way of teaching economics and found no increase in the students' learning, this would not mean the experiment had been a failure: the students might have been able to learn the required material more quickly but chose to use the liberated time not to study more economics but to do better in other subjects or to go to the movies.<sup>43</sup>

In politics as well, our tests have to be sensitive to the possibility that the impact of a variable may be reflected in the actors' choices and, therefore, may not be apparent in the outcomes. For example, one central argument of deterrence theory is that in situations resembling the game of Chicken an actor can increase his chances of prevailing by showing the other side that he is committed to standing firm. The obvious way to test this proposition would be to compare the outcomes of two sets of crises, one in which an actor had committed himself and another in which he had not. But situations in which crises occur when the defender has made a commitment are likely to be different from those that occur in the absence of such pledges, which means that we cannot construct comparisons in which all variables save one are either the same or are randomly different. To be specific, a challenger will move in the face of a commitment only when he is either unable to understand the situation or is extremely strongly motivated to prevail. In either case, he is likely to be particularly difficult to dissuade. Commitment thus might decrease the number of challenges, but not allow the defender to beat back those that do occur.

When actors choose a course of action on the basis of what they think it will produce, we cannot employ comparisons appropriate to a laboratory experiment in which actors were randomized and assigned their behaviors. For example, assume that a comparison of cases in which a state sought to protect itself by threats with instances in which it employed conciliation reveals that

<sup>43</sup> Richard McKenzie and Gordon Tullock, *The New World of Economics: Explorations into the Human Experience*, rev. ed. (Homewood, IL: Irwin, 1978), 285–88. For a discussion of how we are to evaluate programs in light of complications like this, see Irwin Deutscher, "Toward Avoiding the Goal-Trap in Evaluation Research" in Francis Caro, ed., *Readings in Evaluation Research*, 2nd ed. (New York: Russell Sage, 1977), 229–31.

one method worked more often than the other. Such a finding would be interesting, but what could we make of it? Because the state selected its approach by estimating how alternative policies would work in the particular circumstances it faced, we could not infer that the state would have done better to have used the more successful tactic in the other cases. The tactic that failed more often may have been applied in cases that were more difficult or that were not suited to the more successful approach. Of course, we can try to control for as many situational factors as possible, but the statesmen may well look at more subtle cues than we do. To take a case from domestic politics, it may simultaneously be true that members of Congress can increase their chances of reelection by doing extensive work for their constituencies and that a comparison of members who do a great deal of such work with those who do not would reveal no correlation with electoral results, because a member may undertake these activities only when his position is weak.<sup>44</sup>

Standard methods of testing propositions are even more problematic when each actor knows that behavior reveals characteristics that are believed to be linked to what the actor will do later in the interaction. Thus common sense would indicate that big and strong men are more likely to try to fight back against a mugger than are women or smaller men. But the situation is unlike an experiment, not only because muggers do not pick their victims at random, but because victims know this. Thus if a person who appears able to defend himself is attacked, he may realize that only a particularly strong, vicious, or highly motivated mugger would attack him and therefore conclude that fighting back would be especially foolish. The resistance rates among various kinds of victims would then not vary.

### ACTING IN A SYSTEM

Much of this article has argued that systems do not easily accommodate our desires. With so many forces responding to each other, unintended consequences abound, and the direct path to a goal often takes one off in a quite different direction. This seems like a gloomy picture for those who seek change. But there is more to it than that. The fact that there is no straightforward way to reach one's goal does not mean that there is no way to reach it. I will close by discussing three general methods of acting when interconnections are prevalent and powerful. First, people can constrain other actors and reduce, if not eliminate, the extent to which their environment is highly systemic and characterized by unintended consequences. Second, understanding the system may enable people to compensate for the results that would otherwise occur. Third, people may be able to proceed toward their goals indirectly and can apply mul-

<sup>44</sup> Douglas Rivers and Morris Fiorina, "Constituency Service, Reputation, and the Incumbency Advantage" in Morris Fiorina and David Rohde, eds., *Home Style and Washington Work: Studies of Congressional Politics* (Ann Arbor: University of Michigan Press, 1989), 17–45.

tiple policies, either simultaneously or sequentially, in order to correct for or take advantage of the fact that in a system consequences are multiple.

Although an interconnected system is always in motion, the degrees of freedom are not unlimited. Sometimes systems are or can be rendered less than completely system-like in their responsiveness: situations and policies can box them in and facilitate action; constraint can be induced by foreclosing options and severing interconnections. Many military tactics use some forces to pin the enemy in his positions, while others surround or attack him.<sup>45</sup> Sometimes an actor can provide similar constraint by anticipating the other's likely reaction and either neutralizing or discounting for it. Thus when Henry Rowan donated \$100 million to Glassboro State College, in order to prevent the state of New Jersey from cutting its contribution to the college and thereby taking much of the gift for itself, he specified that none of the money could be used for operating expenses or capital projects.<sup>46</sup>

More generally, the belief that undesired results are likely if decision makers do not take unusual steps may lead them to take such steps and prevent the natural outcome from occurring. This is Arend Lijphart's explanation for why many countries are stable in spite of—or really because of—the presence of factors that predispose them toward instability. In studying democracy in the Netherlands, he found that the circumstances were not propitious. The population was divided by reinforcing cleavages of ethnicity, language, and religion. Common sense and many social science theories predict that the result would be violence if not civil war. The reason this did not happen, Lijphart discovered, was that the leaders understood that this was a likely outcome, did not want it to come about, and so crafted a policy of moderation and compromise. This happens in other countries as well.<sup>47</sup>

The basic dynamic is a form of what Albert Hirschman calls an “action-arousing gloomy vision.”<sup>48</sup> If it is believed that a danger can be coped with by strenuous efforts, the anticipation of it can lead people to struggle to overcome it. Thus one study of why the horrifying forecasts of global starvation have not

<sup>45</sup> Basil Liddell Hart, “The ‘Man-in-the-Dark’ Theory of War,” *National Review* 75 (June 1920): 473–84. In Charles Perrow's terms, these actions make the system more linear and loosely coupled: *Normal Accidents*.

<sup>46</sup> Jerry Gray, “Glassboro State College to Receive a \$100 Million Donation,” *New York Times*, 7 July 1992. Similarly, a Senate anticrime appropriations bill specified “that state and local governments would not be permitted to use it to replace money that they divert from crime-fighting to other programs.” See Clifford Krauss, “Senate Approves Broad Crime Bill; Splits Over Guns,” *ibid.*, 20 November 1993.

<sup>47</sup> Arend Lijphart, *The Politics of Accommodation: Pluralism and Democracy in the Netherlands* (Berkeley: University of California Press, 1968); Lijphart, *Democracy in Plural Societies: A Comparative Exploration* (New Haven: Yale University Press, 1977); Jurg Steiner and Robert H. Dorff, *A Theory of Political Decision Modes: Intraparty Decision Making in Switzerland* (Chapel Hill: University of North Carolina Press, 1980).

<sup>48</sup> Albert Hirschman, *A Bias for Hope: Essays on Development in Latin America* (New Haven: Yale University Press, 1971), 284, 350–53; also see Hirschman, *Rhetoric of Reaction*, 153–54.

so far turned out to be correct argues that they “resulted in tremendous efforts to increase food output.”<sup>49</sup> Similar logic led Walt Rostow, Lyndon Johnson’s national security adviser, to see a benefit in France’s withdrawal from NATO’s military machinery: “some European anxiety, if not excessive, could help diminish complacency about European security.”<sup>50</sup> More generally, an awareness of the difficulty of procuring public goods can lead people to establish ingenious arrangements to secure them, even if conventional academic theories indicate that these results are not likely to succeed.<sup>51</sup>

Relatedly, although—or because—the domino theory holds that even small defeats produce positive feedback, because the state’s adversaries and allies will infer that it is weak and prone to retreat in other conflicts. Leaders who believe the theory and who suffer limited defeats may act especially boldly to try to show that the theory is incorrect, or at least that it does not apply to them. In seeking to prevent the operation of the anticipated dynamics, statesmen then disconfirm the theory. Assistant Secretary of State for Southeast Asia William Bundy recalls that “The decision to compromise in Laos [in 1961] made it essential to convey by word and deed that the United States would stand firm in South Vietnam and the rest of Southeast Asia.”<sup>52</sup> President John Kennedy felt the same way: “There are limits to the number of defeats I can defend in one twelve-month period. I’ve had the Bay of Pigs and pulling out of Laos, but I can’t accept a third.”<sup>53</sup> According to Richard Nixon’s chief of staff, after having to make concessions to end the postal workers strike in 1970, the president sought to “fire a bunch of [air controllers] to prove government workers can’t win by striking.”<sup>54</sup>

Intriguingly, decision makers who understand this dynamic may expect a country that has been forced to back down in one confrontation to stand firm in the next. It was this reasoning that led a Soviet diplomat to oppose North Korea’s Kim Il Sung’s request to invade South Korea in the fall of 1949: “After their lack of success in China, the Americans probably will intervene in Korean affairs more decisively than they did in China and, it goes without saying, apply

<sup>49</sup> Peter Drucker, “The Changed World Economy,” *Foreign Affairs* 64 (Spring 1986): 771.

<sup>50</sup> Quoted in Frank Ninkovich, *Modernity and Power: A History of the Domino Theory in the Twentieth Century* (Chicago: University of Chicago Press, 1994), 283. More broadly, peace in Europe may be guaranteed by the American military presence, which all parties want to see maintained so that old fears and rivalries do not reassert themselves: Robert Art, “Why Western Europe Needs the United States and NATO,” *Political Science Quarterly* 111 (Spring 1996): 1–39.

<sup>51</sup> Eleanor Ostrom, *Governing the Commons* (New York: Cambridge University Press, 1990).

<sup>52</sup> Quoted in William Gibbons, *The U.S. Government and the Vietnam War, Part II* (Princeton: Princeton University Press, 1986), 41; also see 23–25, 32.

<sup>53</sup> Quoted in Arthur Schlesinger, Jr., *Robert Kennedy and His Times* (Boston: Houghton Mifflin, 1978), 761.

<sup>54</sup> H. R. Haldeman, *The Haldeman Diaries: Inside the Nixon White House* (New York: Putnam’s, 1994), 145–46. The impulse to strike back after having been humiliated can also have psychological roots, especially for people with personalities like Nixon’s. See Blema Steinberg, *Shame and Humiliation: Presidential Decision Making on Vietnam* (Pittsburgh: University of Pittsburgh Press, 1996).

all their strength to save Syngmann Rhee.”<sup>55</sup> Similarly, shortly after the American defeat in Vietnam, Leonid Brezhnev said: “The fact is that to these defeats in social battles, to the loss of colonial possessions, . . . aggressive circles of the capitalist world react by furiously unleashing military preparations. They inflate their defense budgets . . . build military bases and undertake military demonstrations.”<sup>56</sup>

Leaders who reason this way will call for caution rather than increased pressure after the other side has suffered a defeat. This means that the state that has retreated and its adversary will both behave oppositely from what the domino theory predicts, for they understand that the former will have to try to disconfirm it. Furthermore, if the defending state foresees this sequence, it can safely retreat in the first instance, secure in the knowledge that this will enable it to stand firm next time. We have come full circle: the common knowledge that dominoes will fall unless strong measures are taken leads people to anticipate such measures, and this expectation both makes later resistance less risky and removes the need to prevail in the initial confrontation.

A more general form of the processes described in the previous paragraphs is the tendency for people to act “in twos” when they fear that a single action will produce an undesired relationship or an unbalanced impression. I owe the phrase to Wallace Thies, who explains that the United States tried to orchestrate its policy in Vietnam by pairing coercive bombing with diplomatic overtures. In a variant of the familiar notion of combining carrots and sticks, American leaders felt that while bombing would put pressure on the adversary, if undertaken in isolation it might lead the North to believe that the United States would respond only to force. Diplomatic overtures carried the opposite danger of appearing weak. Proper policy, then, would combine both instruments.<sup>57</sup>

As is true for many of the dynamics we have described, actors can take advantage of the propensity for others to do things in twos. Thus during the spring 1972 North Vietnamese offensive, Henry Kissinger told Brezhnev that “the Soviets had an interest in preventing a North Vietnamese victory; I doubted that the President could come to Moscow [for the scheduled summit meeting] if we

<sup>55</sup> “Telegram from Tunkin to Soviet Foreign Ministry, 14 September 1949,” translated by Kathryn Weathersby, *Cold War International History Project Bulletin*, No. 5, Spring 1995, 7. But it is also quite possible that the American refusal to intervene in China led Stalin to believe that America would not fight for Korea.

<sup>56</sup> *Pravda*, 26 October 1976, 2–3; I am grateful to Ted Hopf for this citation and translation.

<sup>57</sup> Wallace Thies, *When Governments Collide: Coercion and Diplomacy in the Vietnam Conflict, 1964–68* (Berkeley: University of California Press, 1980). Johnson explained to his advisers: “We’ve got to use both hands. It’s like a prizefight. Our right is our military power, but our left must be our peace proposals. Every time you move troops forward, you move diplomats forward.” Quoted in Brian VanDeMark, *Into the Quagmire: Lyndon Johnson and the Escalation of the Vietnam War* (New York: Oxford University Press, 1991), 201–2. As Thies explains, the policy failed in part because it could not be implemented as designed, although it seems doubtful that any feasible American actions could have produced an agreement at that time.

suffered a defeat.”<sup>58</sup> As baseball players complain to the umpire about the last call in the hope of influencing the next one, in domestic politics actors may claim that because recent government decisions have gone against them, the balance should be rectified by some desired program or appointment. Anticipating this process, people may vote for a leader whose political views are different from theirs in the expectation that, secure in her hold over her natural constituency, she will have to bend toward the opposite end of the political spectrum.<sup>59</sup> Leaders can utilize these dynamics as well: some conservative representatives from districts with active liberal groups may have voted for nuclear freeze resolutions in the early 1980s so that they could more safely vote for the new MX missile.<sup>60</sup>

As the previous paragraph implies, when a direct approach will fail, a more circuitous one may succeed. Indeed, pluralist politics, especially when it involves separation of powers, can be seen as arrangements and institutions that constitute a system to generate and deploy forces that will serve general social goals, although each actor seeks only a narrower self-interest. Factions in the polity and branches within the government are made to contend in order to govern, with the premise not only that excessive power leads to tyranny, but also that no one person or organ could successfully integrate all the information and interests in society. By structuring, channeling, and creating conflicts, the processes will sustain democracy; and over the long run, the results will be better than could be achieved by mandating the direct research for the common interest.

Indirect effects can be deployed by changing the incentives others confront, thereby steering them in a desired direction. Thus some people who are trying to preserve mahogany forests reject calls for a consumer boycott: “We should be buying tropical timber so that it remains valuable. If there’s no market for the wood, the forests will be mowed down and the land turned to agriculture.”<sup>61</sup> On a larger scale, economic interdependence often gains political support not by altering the beliefs or goals of top leaders, but by strengthening groups that

<sup>58</sup> Henry Kissinger, *White House Years* (Boston: Little, Brown, 1979), 1144. Kissinger calls this a “startling thesis.” A more apt description would be shrewd and perhaps too clever by half, but not startling.

<sup>59</sup> For an example, see Robert Dallek, *Lone Star Rising: Lyndon Johnson and His Times, 1908–1960* (New York: Oxford University Press, 1991), 377.

<sup>60</sup> Janne Nolan, *Guardians of the Arsenal* (New York: Basic Books, 1989), 145–46; for another example see Adam Clymer, “Gingrich Won’t Duck Tough Medicare Vote,” *New York Times*, 18 October 1995. David Baldwin’s point is perhaps better understood by politicians than by scholars: the common idea “that a broken promise has no value is . . . unacceptable. Anyone with children knows that breaking last week’s promise to take them to the movies makes it much harder to break this week’s promise.” Baldwin, *Paradoxes of Power* (New York: Basil Blackwell, 1989), 125.

<sup>61</sup> Quoted in Les Line, “Advocates of Sustainable Mahogany Harvest Counter Boycott,” *New York Times*, 4 June 1996.

favor an open economic system and giving important actors a stake in foreign trade.<sup>62</sup>

More generally, actors may be able to manipulate the environments in which they or others act in order to generate desired behavior. Many political maneuvers have the effect—and some have the aim—of widening or narrowing the circle of those who are involved, thereby strongly influencing the outcome. Indeed, Schatterschneider argues that “the expansion of the political community . . . has been the grand strategy of American politics.”<sup>63</sup> Even with size constant, actors can affect the contours of the political landscape in part, as Schattschneider shows, by increasing or decreasing the salience of issues that divide the community in different ways. Other manipulative strategies are familiar as well. H. R. Haldeman notes a “fairly typical strategy on Nixon’s part—[was] to set up, or hope for, an external extremist view to be launched which would in turn bring counterpressure on the extremists of the other side instead of letting the current activist element dominate the debate and the action.”<sup>64</sup> Relatedly, actors may be able to place themselves in a position where new forces will be acting on them, as politicians do when they seek to expose themselves to domestic attack if they retreat in a foreign dispute. Sometimes without following a conscious strategy, an actor can have a large indirect effect by framing an issue in a certain way, placing it in a different context, and getting people to regard it differently. These processes may have been the way in which *Brown v. Board of Education* so deeply affected American politics and society: although it did not produce much immediate desegregation, it altered the way people thought about race and about what policies and behaviors were legal, legitimate, and appropriate.

Effective action is often possible by employing multiple policies that constrain and work with the dynamics of the system. The fact that when we are dealing with a system “we can never do merely one thing” means not only that behavior rarely has only one effect, but, more importantly here, that in order to produce a desired change, the actor must do several things. Hardin, who coined this phrase, provides a good example: family planning will not be effective if many children die young, and improving public health in poor countries saves lives but also increases population and so may lead to massive starvation. But health care plus family planning may produce healthy, small families, and a stable society.<sup>65</sup> Other examples are not hard to find: a disease that defeats any single medication may be controlled by a combination of treatments; pests can be controlled—if they can be controlled at all—only by multiple lines of

<sup>62</sup> Helen Milner, *Resisting Protectionism: Global Industries and the Politics of International Trade* (Princeton: Princeton University Press, 1988); Scott James and David Lake, “The Second Face of Hegemony: Britain’s Repeal of the Corn Laws and the American Walker Tariff of 1846,” *International Organization* 43 (Winter 1989): 1–30.

<sup>63</sup> Schattschneider, *Semisovereign People*, 99–100.

<sup>64</sup> Haldeman, *Diaries*, 129.

<sup>65</sup> Hardin, “The Cybernetics of Competition,” 80–81.

attack; where a social reform that relies on either incentives or regulation fails, one that utilizes both may succeed; sending food aid to a country where people are starving often can and must be accompanied by measures to spur indigenous production; after World War II, West German reconstruction, let alone rearmament, would have been rejected by the West Europeans had it not been coupled with the continued presence of American troops and integration that speeded European economic recovery and tied Germany tightly to Europe.

Critics of social reform are correct to note that welfare can decrease incentives to work, that providing decent housing for the homeless will increase their number, and that building new highways is not likely to decrease traffic congestion. For related reasons, subsidized flood insurance can encourage people to live in areas that are prone to flooding, and systems to warn people of tornadoes may lead them to take fewer precautions and be less vigilant. In foreign policy, critics of a policy of deterrence point out that increasing defense spending often makes the adversary more belligerent. But this does not mean that nothing can be done, just that no single policy will be effective. Thus welfare programs can be coupled with education, job training programs, and work incentives; highway programs need to be accompanied by taxes on cars, lanes for car pools, and support for mass transit; flood insurance can be conditioned on requiring that homes be built to minimize water damage; warning systems can be coupled with educational programs stressing that they can never be perfect; deterrence often must be combined with reassurances.

In some cases, we know enough to specify the actions that will combine to produce the desired outcome. But more frequently we have only limited ability to anticipate what will happen. Multiple policies must then be applied sequentially, and actors must be ready to alter their behavior to cope with unintended consequences and the novel strategies that others employ.<sup>66</sup> Flexibility and resilience are necessary for effective action. Good generals not only construct fine war plans, but understand that events will not conform to them; doctors must shift medications as bodies and microbes react to treatments; the policy maker who is psychologically and politically unprepared for surprises is almost certain to fail.

In summary, the idea that social action forms and takes place within a system is familiar. In the study of international politics, the term “system” is commonplace, the most important book of the past decade<sup>67</sup> propounds a systems approach, and basic notions of game theory are staples of discourse. Nevertheless, scholars and statesmen as well as the general public are prone to think in nonsystemic terms. This is often appropriate; and few miracles will follow from thinking systemically, because the interactive, strategic, and contingent nature of systems limits the extent to which complete and deterministic theories are

<sup>66</sup> I am drawing on a slightly different formulation by Aaron Wildavsky, *Searching for Safety* (New Brunswick, NJ: Transaction Press, 1988), esp. 77–79 and 118–120.

<sup>67</sup> Waltz, *Theory of International Politics*.

possible. But we need to take more seriously the notion that we are in a system and to look for the dynamics that are at work. A distinguished student of genetics summarized his perspective in the phrase: “Nothing in biology makes sense except in the light of evolution.”<sup>68</sup> Very little in social and political life makes sense except in the light of systemic processes. Exploring them gives us new possibilities for understanding and effective action; in their absence we are likely to flounder.\*

<sup>68</sup> Theodosius Dobzhansky, “Nothing in Biology Makes Sense Except in the Light of Evolution,” *American Biology Teacher* 35 (March 1972): 125–29.

\*This article is drawn from my book, *System Effects: Complexity in Political and Social Life* (Princeton: Princeton University Press, 1997). I am grateful to Jack Levy and Glenn Snyder for comments and to Jim Caraley for editorial advice.