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Simulation, Rhetoric, and Policy Making

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Many simulations are undertaken in hopes of forming or changing the beliefs and policies of policy makers. A simulation used for this purpose becomes a rhetorical device, a tool of social influence. The authors review some of the important principles of attitude change incorporated in modern rhetoric and show how they might be employed to increase the influence of simulations in policy-making processes.

Keywords: *attitude; attitude change; beliefs; belief change; policy; policy change; policy making; rhetoric; simulation; simulation influence; social influence*

Simulations seem to be everywhere, like bees on a warm summer day. They have, like our six-legged friends, been with us for centuries—consider, for example, the history of dramatic simulations on the stage or of children's toys and games. However, the arrival of computing and communication technologies has ignited an exponential proliferation in simulations of all kinds. One variety, action and adventure computer games, is now a multi-billion-dollar industry rapidly evolving to render improbable situations in increasingly realistic ways. Another variety, simulated visualizations, provides engaging charts and animations to illustrate everything from weather patterns to voting trends, from battlefield tactics to Mars landings. A third variety, educational simulations, continues to proliferate far beyond drill and practice into areas of study as diverse as history, ecology, and neuroscience—a trajectory frequently documented in *Simulation & Gaming* (see, e.g., Feldbaum, Buckley, & Levitt, 1976; Hemmasi & Graf, 1992; Tsuchiya & Tsuchiya, 2000).

The prescient founders of *Simulation & Gaming* have done a great service to the scholarly community by offering a forum for those of us who study the effects of simulations on their users and on society. Thanks to articles published in this journal, we now have a better idea of the extent of intended effects of simulations and the

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nature of their unintended effects. We have been able to compare experiences to improve the effectiveness of simulations, especially in the area of education. These are important accomplishments.

So it seems fitting to make use of what we and others have learned about improving the effectiveness of simulations to address a growing category of simulations: those employed in hopes of assisting policy makers to make better judgments and decisions about the rules, regulations, or laws governing the conduct of members of organizations, including society. Perhaps the best known of these simulations can be found in *An Inconvenient Truth*, Al Gore's 2006 film on climate change. Yet policy-related simulations can also be found on the computer monitors in hundreds of other venues. Economists, for example, use simulations to advise governments about the possible effects of changing fiscal policies (see, e.g., Barnes, Kalaitzandonakes, & Crowe, 2005; or any issue of *Economic Modelling*). Urban planners use traffic simulations to assist senior bureaucrats in the formation of traffic regulations (see, e.g., Moazzam Ishaque & Noland, 2007). Other simulations are used with the intention of improving health resource allocations, immigration and tax policies, air traffic regulations, school closure decisions, utilities deregulation, and crisis management (see, e.g., Mayer & Wenzler, 2005; Quanjel, Willems, & Talen, 1998). Many preliminary renditions of such simulations are reported in academic publications such as *Journal of Artificial Societies and Social Simulation, Journal of Policy Modeling, International Journal of Simulation Systems, Science and Technology, Simulation in Healthcare,* and *Journal of Marketing Research.* Organizations such as the Centre for Policy Modelling (Edmonds, 2008) regularly generate technical papers on topics related to computer simulation of policy environments and decisions. Texts (see, e.g., Gilbert & Troitzsch, 2005) and articles (see, e.g., Thorngate, 2000) are available to teach relevant simulation techniques.

Specialized software for policy-related simulations is now beginning to appear (consider Caliper's [2008] TransModeler for traffic modeling; REMI's [n.d.] Policy Insight; GoldSim's [2008] GoldSim; isee Systems's Stella). Even so, its use will likely never surpass the oldest and by far most popular software for simulation: the spreadsheet. Cynics argue that the spreadsheet has done for good decision making what the word processor has done for good writing. Still, the proliferation of financial functions and "What if?" menu items in modern spreadsheet software reflects its continuing importance in many policy decisions.

Although older reviews exist (see, e.g., Anderson, Patton, & Lienesch, 1975; Joldersma & Geurts, 1998), we know of no recent and comprehensive review of how simulations are used for policy decision making or evaluation of how much these simulations improve the decisions made. Even so, it is probably safe to speculate that sometimes simulations are used and do improve policy decisions, that sometimes they are used but do not improve policy decisions, and that they often are used not at all. An important question follows: What distinguishes the simulations that were used successfully from those used unsuccessfully or ignored? An answer to the

question would be useful for avoiding the pits into which well-intentioned, costly, and potentially useful simulations might fall.

Let us restate the question in more practical terms: What is the best way to present methods and results of computer simulations to improve policy decision making? Although we lack a body of well-conceived evaluations or case histories relevant to answering this question, we can still generate some useful suggestions by indirect means. Below we try to show how theory and research in social and organizational psychology, human judgment and decision making, and simulation and gaming can be employed to construct our suggestion list.

Rhetoric

Let us be frank. Almost all information offered to those who make or modify rules, regulations, laws, or other policies is offered with the intention of influencing their policy decisions. With all due respect to truth, efficiency, optimization, and other high-sounding ideals, no one who produces information for policy makers does so hoping their product will be ignored. The euphemisms may be education or advice, but the goal is influence, and the art of influence is called *rhetoric.*

The rhetoric inherited from Aristotle and his Roman followers produced a list of prescriptions for increasing the chances of influencing others and of protecting against the influence of others. Speak clearly. Mind your logic. Use vivid examples. Engage the attention of your audience with an occasional rhetorical question. Be mindful of *non sequiturs.* When your case is weak try *ad hominem* arguments. These suggestions and many others composed the core of early rhetoric, and they are still taught in workshops on public speaking, debating, and lecturing.

Much has changed since the early days (see Sloane, 2001). Campbell (1776; also see Walzer, 2003) was among early scholars to resuscitate the study of rhetoric more than 200 years ago. Campbell's work stimulated rhetorical applications to business communication in the 19th century (see Carbone, 1994). Psychologists appropriated the rhetorical concept in the 1920s, studying it further under the title of attitude formation and change (Cialdini, 1993). Businesses then appropriated the psychological rendition under the name of marketing (Twitchell, 2004). Rhetoric is the stuff of many media studies (McLuhan, 1964; Schramm & Roberts, 1971) and legal education (Huhn, 2008) courses. Modern rhetoric now finds more ignoble applications in public relations, political campaigning, and spin (see, e.g., Simpson, 1994).

As the domain of rhetoric has expanded, so too has the list of tactics known or assumed to influence people's judgments and decisions. Modern advertisers, for example, makes frequent use of animation, sound, music, graphics, color, shape, beauty, humor, drama, and surprise to increase the chances of consumers deciding to buy the products they promote. Educators make increasing use of multimedia presentations to increase "student engagement"—this year's neologism for persuading

students to study. Job applicants follow popular prescriptions for content and style to make their resumes "competitive"—presumably to influence employers' hiring decisions. Public relations professionals fidget over the wording of press releases, transforming problems into challenges, slim chances into opportunities, lies into misspeaks, freedom fighters into terrorists (or vice versa), and mediocrity into excellence with the intention of manipulating the judgments and decisions of those foolish enough to believe their fluff.

Behind the proliferation of such rhetorical tactics are a handful of social psychological principles about attitude formation and change. Some of these principles are derived from the assumption that attitudes mediate judgments and decisions, leading to the prescription that forming or changing attitudes should affect judgments and decisions made. A child who is indifferent to smoking may, for example, be persuaded to adopt a personal no-smoking policy if the act becomes associated with a bad smell and taste, high expense, illness and premature death. Parents often invoke rhetorical tactics to form these associations, and, when they are successful, they increase the chances their children will decide not to smoke. Of course, experience teaches us that some children will decide to smoke even when they know it is a dirty and dangerous habit. This is often because peers have influenced them in the opposite direction by exploiting their desire for social identity and group membership. The exploit can be observed in the cheap but effective rhetorical trick of associating smoking with social rewards such as admiration or peer acceptance and associating not smoking with social punishments such as teasing or peer rejection. Rhetorical tactics can be used by different people for conflicting purposes, and the winners of rhetorical competitions are more likely than the losers to enjoy the fruits of the hearts and minds of their target audience.

What are the social psychological principles of attitude formation and change underlying a rich variety of rhetorical tactics? By way of brief review, we list six below (for more complete lists, see Cialdini, 1993; Mehrabian, 1970; Thaler & Sunstein, 2008).

1. Attitudes have three components. The *cognitive component* reflects the strength of associations between ensembles of neurons representing concepts and ideas—the stuff of the cortex. These associations are called *beliefs.* If an ensemble of neurons representing John's concept of, say, traffic congestion almost always excites an ensembles of neurons representing John's concepts of delay, noise, and pollution, then we say John believes traffic congestion causes delay, noise, and pollution. If John's traffic congestion ensemble does not excite the ensembles representing, say, peaches or feathers, then we say John does not believe traffic congestion is peachy or feathery.

The *emotional component* of attitudes reflects activations of neurons in the midbrain related to arousal and feeling. Ensembles of cortical neurons have connections to ensembles of midbrain neurons causing beliefs to excite emotions. If firing the ensemble in the cortex representing traffic congestion in the forebrain excites a "feels bad" ensemble in the hypothalamus—either directly or through mediating

concepts such as delay, noise, and pollution—then we would infer that John has a negative attitude toward traffic congestion.

The *behavioral component* of attitudes reflects what people say or do or decide as the result of their beliefs and emotions. If John dislikes traffic congestion because of its association with negative emotions associated with delay, noise, and pollution, then we would assume that he is more likely to look for routes to avoid congestion, or to vote for tax increases to pay for reducing congestion, than is Mary who doesn't mind noise and who associates traffic congestion with listening longer to pleasurable MP3 tunes.

All pathways among beliefs, emotions, and behaviors seem to be bidirectional. Beliefs can excite emotions, but emotions can also excite beliefs (think of Freud's concept of rationalization; also see Zajonc, 1980). Beliefs can direct behaviors, but behaviors—or at least their consequences—can also change beliefs (Dewey called this learning by doing; also see Bem, 1967; Festinger, 1957). Similarly, emotions not only modify behaviors, but behaviors—or at least their consequences—can modify emotions (think of habituation or boredom that comes from repeating a behavior; see Helson, 1964).

Some rhetorical tactics attempt to form or change beliefs, some attempt to form or change emotions, and some attempt to form or change behaviors. Most of the rhetorical tactics used to influence policy decision making attempt to change beliefs about the consequences of decisions, leaving the emotional component untouched. In different words, most of the rhetoric of policy decision making attempts to change not hearts but minds. This, as we argue below, is often a strategic error.

2. Attitudes are formed and changed by associations among ideas or between ideas and emotions. The challenge of rhetorical tactics is thus to associate good emotions with an idea, dissociate bad emotions from the idea, associate bad emotions with competing ideas, or dissociate good emotions from competing ideas. Traditional rhetoric emphasized making these associations through logical derivations. Modern rhetoric exploits the psychological principle that the associations need not be logical. Simple pairings in time and space will often suffice to create associations just as powerful as those create by logical argument—think of Pavlov's dogs learning an alogical association between a bell and food or the thousands of advertisements and political speeches associating good things such as happiness, safety, approval, prosperity, or freedom with products, services, or voting choices.

Simulations attempt to make associations through logical derivations, many of them illustrating the disasters that logically follow the pursuit of current policies—consider simulations of climate change. Such simulations often compete with other rhetorical techniques that make their case with bell–food pairings between product and sex, service and happiness, a right-wing political agenda and freedom. In an age of sound bites and instant gratification, these competitors generally draw more attention and pack more rhetorical punch, even when the validity of their claims is

low (see Lindstrom, 2005). When competing on such a crowded stage, simulations illustrating the possibility or pursuit of happiness are likely to be more effective than simulations verifying the inevitability or avoidance of misery, simply because people respond more readily to promises of rewards than threats of punishments (see, e.g., Skinner, 1972).

3. Attention and comprehension are necessary, though not sufficient, for attitude change. Information cannot form or change attitudes if people do not attend to or comprehend it. Mass marketing and political rhetoric exploit psychological principles of attention and comprehension including the principle of contrast (design your message to stand out from its background) and the principle of the lowest common denominator (no one ever lost money underestimating the intelligence of the general public). Scientists rarely indulge in these forms of rhetoric, which is one reason why even valid scientific arguments derived from well-conceived simulations are often too boring to attract or sustain the attention of policy makers or too dense to promote their comprehension. We may all believe that substance should trump style. Yet substance alone is rarely sufficient to win an argument or to capture enough attention and comprehension to change the hearts and minds of policy makers. As philosophers would argue, if a simulation falls in the forest and no one pays attention, the simulation does not exist. Simulation without an audience is no simulation at all. If style can attract attention and increase comprehension of policy makers, then style is foolish to ignore.

4. We form and maintain attitudes as often to please others as to gratify ourselves. We form and maintain an attitude when it excites positive or inhibits negative emotions in us. We also form and maintain an attitude when other people's reactions to our attitudes excite positive or inhibit negative emotions in us. As a result, almost all attitudes have a social as well as a personal component. Often the two components conflict (see Janis, 1972). For example, we may believe that spitting is personally gratifying, but we refrain from spitting because we fear that it will upset our friends, who might then, to our chagrin, withdraw their friendship. Many rhetorical tactics fail to change behaviors because they ignore the social component of attitudes and the social consequences that attitude change may bring. A simulation that shows why policy makers should ban cars and promote bicycles may still not lead to the ban if policy makers fear the result would cost them the next election. So it is wise to learn about social as well as personal components of attitudes and address them, if possible, in the presentation of a simulation (see Rosenstock & Jackson-Lee, 2002).

5. It is easier to form attitudes than to change them and easier to change trivial attitudes than important ones. New attitudes, by definition, carry no emotional baggage and are relatively easy to form, especially when they are removed from daily life. Consider, for example, how easy it is for a child to form an attitude toward Brussels sprouts or video games; one experience will usually suffice.

Similarly, attitudes about trivial matters are relatively easy to change. This is why advertising campaigns to change brands of breakfast cereal or toilet paper are often successful.

In contrast, it is quite difficult to change central or important attitudes. Such attitudes, especially those long held and important to our conception of our self and our social identity, carry with them a history of expression, habits, social relationships, and links to other attitudes. Some or all of these may require change if the central attitude is changed, and conflicts with old attitudes may then arise. The changes and conflicts are likely to disrupt daily life, so they are likely to be stressful and resisted. Consider, for example, what might happen if one's attitudes toward one's parents, children, or culture were suddenly reversed. Vested interests that accompany central attitudes are the primary source of resistance to therapy, which is why therapists take so long, if ever, to change a client's central attitudes about self or family.

Attempts to form or change attitudes through simulation show similar patterns. Simulations challenging long-held, central beliefs are more likely to be criticized than those forming new beliefs or challenging peripheral ones. Thus, children unschooled in economics would probably find it easier to believe the results of a simulation showing the evils of winner-take-all capitalism than would free-market-friendly adults. Sedentary adults would likely find it easier to accept the implications of a simulation about the heath benefits of a new cereal than an simulation about the health dangers of a sedentary life. Religious adults would more likely criticize a good simulation challenging the benefits of religion than a bad simulation demonstrating the benefits of sports injury insurance.

6. Know your audience. Although the principles of rhetoric may be universal, the effectiveness of their application depends largely on how well the communicator, medium, and message are matched audience characteristics and environments. An ignorant policy maker who believes all Muslims are untrustworthy is unlikely to be swayed by a simulation presented by an Iranian academic. Publishing an insightful simulation in a journal such as *Simulation & Gaming* would have no effect on policy makers if they did not read its articles. The eyes, ears, or minds of most policy makers are likely to close when presentations of simulations include technical references to differential equations, complex algorithms, or sophisticated statistical analyses. In addition, a simulation is unlikely to sway policy makers if it requires 2 hours to understand and they have 10 minutes to spare. Rightly or wrongly, few policy makers are eager to invest their effort learning simulation techniques and jargon in the hopes of improving their decision-making skills. So it is incumbent on gamers or simulation experts wanting to influence their audience to adapt to their audience. Perhaps at some future time all policy makers will be educated in programs that teach them simulation techniques (see Duke & Geurts, 2004). Until then, the challenge for all those who wish to influence policy makers is to package and deliver their offerings in ways that get inside the head and heart of policy makers in ignorance of technical details.

Policy Makers and Their Environment

As implied by the dictum "know your audience" above, if we want to make effective use of rhetorical principles to increase the chances of influencing policy decision makers with simulations, then we must know a bit about who these people are and how they think and feel—what makes them tick. Who are these folks? People who make the rules, regulations, and laws that so often affect other people's lives (often adversely) and set the course of organizations and societies tend to congregate in boards of directors, parliaments, executive councils, and such. They are personified by the stereotypical politician: socially skilled, rich, powerful, busy, distrusted, manipulative but manipulable, narcissistic, sometimes corruptible, with a background in either business or law.

Policy makers can make decisions in dozens of different ways using a large variety of criteria and procedures called *heuristics* (see Kahneman, Slovic, & Tversky, 1982). For example, some policy decision makers use a categorical imperative heuristic to make their decisions, trying to fit the current situation into some religious or moral category associated with some necessary action—"Exploit Oil Company is run by humans. The Bible says God wanted humans to have dominion over nature. Therefore we must approve Exploit Oil's application for drilling rights in the Grand Canyon." Policy makers can also use a historical precedent heuristic fitting the current situation to memories of past problems and reproducing a previously successful solution—"Twenty years ago, we solved the traffic problem by building freeways. Let's do it again." Decision makers who use such heuristics are unlikely to be greatly influenced by information of decision consequences. So simulation experts wishing to influence them are better advised to polish arguments for one moral category over another, or for the goodness of fit of alternative precedents, than to invest their time on the likely consequences of choice.

Although many policy makers employ categorical imperatives or precedents—even flipping a coin—to make some policy decisions, at least as many try to employ some variation of the *rational calculus* to make others. The rational calculus prescribes that policy makers should make their decisions in five steps (see Geva-May, 2005):

- explicating alternative policies
- listing the possible outcomes of pursuing each alternative policy
- assigning a value (benefits–costs) to each possible outcome
- estimating the probability that each possible outcome would occur
- calculating an *expected value* of each alternative policy by multiplying the value of each of its outcomes by the corresponding probability of occurrence and adding up the result

Each alternative should then be ranked according to its expected value. The alternative with the highest expected value should be chosen as the best choice in the long run.

Although there is considerable evidence that few people follow the prescriptions of the rational calculus to the letter (see, e.g., Geva-May, 2005; Thorngate & Tavakoli, 2005), the calculus still captures salient characteristics of many decision-making processes. One example is found in the practice of what some call *spreadsheet decision making*—choosing policies based on calculations of expected values derived from estimates of the probabilities that assorted costs and benefits would follow the pursuit of alternative policies. Most alternative tax regulations, hospital bed allocations, insurance rate premiums, and such are likely assessed in spreadsheets to find putatively optimal policies.

Many simulation experts see their most influential role as providers of probability estimates, believing their simulations can predict the consequences of alternative policies. Some simulations, such as those predicting the consequences of assorted engineering designs on traffic flow, heat loss, or lowland flooding, do support this optimistic belief. Alas, others do not. Orrell (2007) provides a compelling review of the failures of simulations to predict the trajectories of weather, stock markets, and biological systems. Economic forecasts show the same sad fate, exhibiting precipitous decline in their accuracy as future consequences shift from tomorrow to next week and beyond. Some simulators respond by adding fists full of additional variables to their simulations, hoping to increase their forecast accuracy. Orrell shows why the exercise is futile.

Still, the futility may be no great cause for concern. A generation ago, Thorngate (1980) reported a simulation comparing the prescribed decisions of the rational calculus based on (a) precise and accurate estimates of outcome probabilities to those based on (b) ballpark and often inaccurate estimates of the outcome probabilities based on simple heuristics (one example: "assume the most likely consequence will occur and ignore the rest"). Surprisingly, but reassuringly, the prescribed choice based on ballpark estimates was almost always the same as the prescribed choice based on the precise ones. When the ballpark probability estimates lead to a different choice, it was almost always the second best of several choices, and its expected value was only a fraction lower than that calculated using precise probability estimates. One ballpark estimate heuristic was especially good at prescribing the choice as the precise estimates: assume that every outcome is equally likely. This equal-probability heuristic generated the same prescription as its precise cousin more than 95% of the time.

If the accuracy of probability estimates (beliefs) about the outcomes of alternative policies is not critical to good decisions, then what is? Three answers come from our list above:

1. explications of alternative policies
2. lists of possible outcomes of each policy
3. assessments of the value of each outcome

Each of these requirements for good policy decision making has implications for simulation as a rhetorical device.

Explicating possible alternatives. Alternative policies rarely reveal themselves; instead, they must be conceived by decision makers or those who advise them. It is rarely easy to conceive of several alternatives at once, which is one reason why most policy alternatives are copied from the policies of others. A frequent result is to consider each alternative as it is conceived, one alternative one at a time. Most policy decisions are choices between one alternative and the status quo; when one is chosen, the search for further alternatives usually ends. By limiting the range of alternatives in this way, policy makers may well choose an alternative worse than one they could have chosen had more been presented at the same time. Decreasing the range of alternatives considered increases the chances that the best one will be overlooked, forcing decision makers to satisfice rather than to optimize (Simon, 1955).

Policy simulations have a wonderful capacity to stimulate the conception and explication of alternative policies because each variable included in the simulation prompts the question, "What would happen if a policy varied this?" Programming a simulation forces the simulator to be explicit about variables and their relations and encourages the simulator to try different combinations of variables and relations when explication is difficult. Ask a policy maker unaided by simulations to conceive of, for example, one or more policies that would reduce crime and the result is likely to be one theme ("Discourage people from criminal acts.") with a few variations ("More police!" "Bigger fines!" "Longer jail terms!"). Ask a simulator to write a program that simulates increases in crime, and the result is likely to include variables related to socioeconomic status, lifestyle needs, age, social networks and influences, free time, and variables that encourage people to engage in noncriminal acts. Even before the simulation is run, alternative policies can at least be sketched from the resulting list of variables. Consider, for example, policy alternatives that focus on changing social networks and influences—perhaps some rewarding leading figures in the networks to influence their followers away from crime. Even it the alternatives so conceived might eventually be discarded, they will stand a chance of being considered.

Knowing what outcomes are possible. The Law of Unintended Consequences (Merton, 1936) states that we can never anticipate all possible outcomes of our decisions, especially the indirect or the delayed ones. Some of the unanticipated outcomes can be beneficial—it has been a pleasant surprise, for example, to discover that policies encouraging the development of the Internet have led to e-commerce, which has in turn increased the development of small businesses. However, at least as many unanticipated outcomes are harmful, and some may be irreversible. Few people, for example, expected improvements in nutrition to accelerate a nursing home crisis because few thought about the possibility of increased physical health causing more people to outlive their normal cognitive functions.

Although some outcomes of different policies are surely beyond anticipation, there are still many possible outcomes that, in principle, can be imagined simply by taking the time and making the effort to think them through. It is relatively easy to list

possible immediate and direct consequences of most policy decisions. Raise taxes, for example, and we can expect that within a week it will be reported in the news, the stock market will temporarily dive, conservatives will denounce the raise, liberals will remain silent, many citizens will grumble, and government popularity will decline. It is much more difficult to determine long-term consequences mediated by networks of indirect connections. Who can tell whether a tax increase will affect, say, tourism growth next year or the number of students entering university 10 years hence?

Some of the difficulties of anticipating indirect and delayed outcomes can be reduced by simulation exercises. Many simulations allow us to "fast forward" the consequences of our assumptions, often revealing indirect and delayed outcomes that we might otherwise not anticipate. We can then change the assumptions, fast forward again, and see which outcomes are affected. The procedure, of course, is one form of sensitivity analysis. Tabulations of the consequences of changing assumptions will reveal which outcomes are sensitive to assumptions and which are not. Insensitive outcomes are likely to happen regardless of what we assume, so there is little need to debate them. Energy can then be more constructively focused on the testing assumptions that, when varied, lead to quite different outcomes.

A similar strategy can be followed to examine the possible effects of different policies. Though the task can be tedious, each assumption can be paired with each policy to see how policies "play out" across different assumptions. Here too we can expect that some policies will have little effect on outcomes under most assumptions, some policies will have large effects under most assumptions, and some will have large effects under some assumptions and small effects under others. The first group will reveal what outcomes are insensitive to different policies, the second group will reveal which policies are best for reaching given outcomes, and the third will reveal where further research is needed. Most simulations of climate change, for example, reveal that the earth is warming and will continue to do so across a wide range of modest shifts in energy policies. Most simulations of public health suggest that small investments in clean water will save far more lives than large investments in MRI machines. In addition, most simulations of stock market price trends reveal that no policy is universally recommended under all assumptions.

Assessing value. Policy choices are above all an expression of values—either the raw values that reflect motivational orientations and emotional reactions to each possible outcome or the expected values that are calculated pursuant to the rational calculus discussed above. Many values may originate in the gut or the soul and be immutable. People who place a high positive or negative value on abortion or family, profit or God, for example, are unlikely to change their value in the light of new information. Still, other values may be subject to change by simulation.

It is useful to remember that values have both *valence* (goodness or badness) and *salience* (importance). Information can be catalytic in forming or changing the valence or salience of outcomes. How can information from simulations form or

change valences? The most obvious answer is by association (see Rhetorical Principle 2 above). If a simulation can demonstrate that many good outcomes and no bad outcomes will accrue from the pursuit of a new policy, then the new policy is likely to acquire a positive valence. Conversely, if a simulation can show that a new policy produces only bad outcomes and no good ones, then it is likely to acquire a negative valence.

More complex reactions are likely to occur when a simulation links alternatives to roughly equal numbers of good and bad outcomes. Policy makers are likely to react with conflicting and stressful emotions—consider the apocryphal story of former U.S. President Harry Truman pleading for one-armed economic advisors who would not say, "On the other hand. . . ." These emotions, in turn, may lead the policy makers to dismiss or ignore simulations or simulators who produce ambiguous results, despite the truth of the ambiguity.

Policy makers might also reduce their stress by assessing the salience of their conflicting valences—by considering not what is good or bad but by considering what is important or unimportant. Sensitivity analyses afforded by many simulations, and discussed in the previous section, can be especially useful in their consideration. If a sensitivity analysis showed that a salient outcome would not change as the result of making several different policy assumptions (the outcome would almost certainly occur or almost certainly would not), then a policy maker could focus on less salient outcomes that were sensitive to assumptions. Conversely, if a sensitivity analysis showed that small changes in assumptions would dramatically alter a salient outcome, then the policy maker could pay more attention to the assumptions.

Informal versions of such a sensitivity analysis are rumored to be common among politicians. Many politicians appear to give greater salience or weight to reelection than to personal preference or conscience. If these politicians believe that their vote on a policy proposal would affect their reelection chances, any conflict between their personal preference or conscience and their reelection is likely to be resolved in favor of reelection. If they believe that their vote would not affect their reelection chances, then personal preference or conscience is more likely to prevail. Simulation provides a method of estimating the plausibility of their belief under varying assumptions about voter reactions. In this way, simulation can alter values by altering salience.

How to Behave

We who indulge in policy-related simulations are inclined to believe that they are powerful tools for improving policy choices. It is important to admit, however, that most policy makers do not share our indulgence and remain indifferent to the beauty of our inclination. There are, as we have noted, many ways to make policy decisions that require no simulations, and we compete with these ways on a crowded stage of social influence. Our challenge as simulators is to convince policy makers that what

we offer will lead to noticeable improvements in policy choices. To do so, we must first attract their attention and increase their comprehension of our offerings (see Rhetorical Principle 3). Both require that we adapt our medium, our message, and ourselves to our audience (Principle 6) rather than trying to adapt our audience to us.

To begin our necessary adaptation, it seems prudent to assume that, for the foreseeable future, simulators will likely make their mark as advisors and consultants and that the effectiveness of a simulation in directing the course of policy decisions will be determined as much by the credibility and style of simulators as by the sophistication of their simulation. This prompts two questions: How should a simulator play the role of consultant or advisor? How should she or he present a simulation?

In keeping with Rhetorical Principle 6, "know your audience," recent research (Tavakoli, 2008) indicates that the preference and effectiveness of different advisors and advice styles depend very much on the advisee. Iranian advisees, for example, prefer directive advice ("Do X!"), while Canadian advisees prefer nondirective advice ("Our simulation suggests that the chances of good outcomes are somewhat higher if X is chosen over the alternative policies, but the choice is yours. . . ."). It is, however, safe to assume that few policy makers in any culture are enthralled by detailed discussions of simulation methodology or of the conditional complexities of simulation results. The late Pierre Trudeau, former prime minister of Canada, was rumored to instruct his advisors to summarize all major points of a policy debate in no more than two typed pages. Under such constraints there is little a simulator can do to present a complex simulation for policy makers to ponder. It is then worthwhile for a simulator to reach her or his own policy recommendation and present it with minimal explanation, prepared for expanding the explanation in case of sudden interest. Scientists are taught to present their methods before their results. Consultants learn to present their results before their methods or, when time is short, not to present methods at all.

When constraints of time or motivation prevent a simulator from making a good argument, it is sometimes useful to let others do it. Consider a policy maker with no time to discuss a simulation with its creator but with considerable time to be briefed by close advisors. A simulator would then be wise to consider discussing the simulation with the advisors, letting them condense the pitch for their boss.

Verbal synopsis is not the only way to condense a long argument. So too are graphics and animation. The stories that many simulations tell can be told in different ways. A 30-minute verbal description of a climate change simulation, for example, can probably be condensed into a 30-second animation. Yet not all animations are effective, so it is advisable for simulators to learn something about the art of storytelling to avoid pratfalls equivalent to those we have all suffered at the hands of PowerPoint novices. If one can learn by example, we mention two: the Web site of the University Corporation for Atmospheric Research (2008) and the Web site of National Geographic (2008).

It is paradoxical that although policy simulations strive to capture increasing richness and complexity of the world affected by policy decisions, policy makers strive to reduce the richness and complexity of their decision-making tasks. In the best of all

possible worlds, all policy makers would be knowledgeable about simulation and use simulation tools as effortlessly as they now use telephones. Perhaps new generations increasingly educated by simulations will approach this ideal. In the meantime, there is nothing better than a credible simulator telling a complex truth with simple story.

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