

ARTICLES

Bounded Rationality and Political Science: Lessons from Public Administration and Public Policy

Bryan D. Jones
University of Washington

ABSTRACT

By 1958, a model of human behavior capable of serving as the microlevel foundation for organizational and policy studies was in place. The scientific soundness of that model is unquestioned, yet the fundamentals of that behavioral model of choice have not yet been incorporated into political science. Much analysis relies on models of rational maximization despite the availability of a more scientifically sound behavioral base. In this article I examine the reasons for and ramifications of this neglect of sound science in political science, focusing primarily on public policy and public administration. While neither approach can lay claim to major successes in prediction, the behavioral model of choice predicts distributions of organizational and policy outputs in a superior fashion.

Most people who study politics and government care little about the fine details of the specifics of human cognition; they are quite content to leave that to biologists, psychologists, and cognitive scientists. What they cannot escape, however, is the need for some firm foundation that can link human behavior to macropolitics. That foundation must fulfill three criteria: First, it must do no harm (it should not mislead); second, it must allow movement between individual-level processes and organizational processes in a more or less seamless manner; and third, it should be efficient in that it does not drag in specifics of human behavior that are not needed to understand the policy-making process.

I will show how the model of bounded rationality, as initially articulated by Herbert A. Simon, a political scientist, (and then expanded by Simon, organizational theorists such as James A. March, and cognitive scientists such as Allen Newell) fulfills these criteria. This foundation has been available since 1958.¹ I will show that the common alternative assumption, comprehensive rationality, fails to produce satisfactory scientific predictability and that bounded rationality is a superior mechanism. It is superior in two respects: It performs better in linking the procedures of human choice with the organizational and policy processes, and it performs better in predicting organizational and policy outcomes in a very important class of collective behaviors. Neither approach does very well in “point prediction” (predicting precise events), but bounded rationality makes distributional predictions in

¹ This paper draws heavily from Jones 2003 and Jones 2002. I appreciated comments from Frank Baumgartner, Steve Brown, Jon Mercer, Tracy Sulkin, and Jim True.

DOI: 10.1093/jopart/mug028

Journal of Public Administration Research and Theory, Vol. 13, no. 4, pp. 395–412
© 2003 Journal of Public Administration Research and Theory, Inc.

a manner not matched by assumptions of full rationality. Finally, I examine studies in public administration and public policy that have relied on comprehensive rationality as an underpinning, showing how they reach an impasse when prediction fails and how they lead to overinvestment in one aspect of the complexities of public organizations.

THE TENETS OF BOUNDED RATIONALITY

Simon made the first bold step toward the development of a decision-making model capable of aiding the understanding of collective choice in organizations with the publication of *Administrative Behavior* (1947). Simon admitted that the model articulated in that book consisted largely of “residual categories,” and that “the positive characterization of the process of choice is very incomplete” (1976, xxix). By 1958, however, all the elements for producing an organizational and policy science based on a positive model of choice were in place. The basic elements of that model have been confirmed and reconfirmed by cognitive scientists in the laboratory and by students of organizations and policy processes in the field. Unlike the competing model of fully rational choice, Simon’s model is consistent with what we now know about the evolution of human cognitive capacities. Yet the approach, rather than serving as the undisputed decisional foundation for modern social science, has engendered much confusion and controversy.

1958 is a critical year because four path-breaking works were published around that time. In all of these works, Simon was a crucial participant.

1. *Behavioral choice*. In 1957, Simon published a collection of his papers under the title *Models of Man*. The volume included his 1955 paper “A Behavioral Model of Rational Choice,” which appeared in the *Quarterly Journal of Economics* (Simon 1955). (Simon received the Nobel Prize in Economics in 1978 for this paper.) With this work, bounded rationality became a positive theory of choice, not solely a critique of comprehensive rationality.
2. *Cognitive psychology*. The field of psychology during the 1950s was in the grips of Skinnerism: To be scientific, it was claimed, one could not rely on the artificial and unobservable constructs of mental processing. In 1958, Allen Newell and Herbert Simon published “Elements of a Theory of Human Problem-Solving” in the *Psychological Review*. This article formed the basis for modern cognitive psychology, which gets “inside the heads” of people to examine how they think and reason (Newell and Simon 1958).
3. *Artificial intelligence*. In 1957, Newell, Simon, and Clifford Shaw published a joint paper, “Empirical Implication of the Logic Theory Machine,” which argued that computers could be used to model human thought; this was a breakthrough in the field of artificial intelligence (Newell, Shaw, and Simon 1957; Newell and Simon 1956).
4. *Behavioral organization theory*. In 1958, March and Simon published *Organizations*, a tour de force that established the field of behavioral organization theory. The work linked organizations and the newly developed behavioral theory of choice. Behavioral organization theory “gets inside the organization” to examine the role of organizational processes in determining bureau or firm outputs in a manner analogous to the way that behavioral decision theory does for the individual.

By 1958, then, all the elements of a scientifically sound model of human choice and the capacity to expand that model downward into psychological processes and upward into organizations and political and economic institutions were in place. It is fascinating to note how little of the stream of research in economics and political science actually made use of the model. In political science, much time was spent fighting Simon's approach as "too scientific" for the humanistic study of politics; later the public choice approach simply ignored the model. Economists "went on counting angels on the heads of neoclassical pins" (Simon 1999, 113).

It is no accident that the behavioral model of choice came more or less directly from the behavioral discipline of political science. Simon credited his participation as a student in Charles Merriam's behavioral revolution at the University of Chicago in the 1930s for this influence (Simon 1996a). The scientific tenets of political behavioralism were strong on observation and quantification and not as strong on theory; the movement had a clearly inductive flavor. It demanded real-world observation—Merriam wanted to make a difference in the conduct of public policy as well as in the conduct of scientific inquiry.

Four Principles of Bounded Rationality

Bounded rationality emerged as a critique of fully rational decision making. What Simon termed the behavioral theory of choice was an attempt to state the positive aspects of a theory of human choice based on scientific principles of observation and experiment rather than the postulation and deduction characteristic of theoretical economics. I will first review the four principles of bounded rationality and then discuss the modern conceptions of the behavioral theory of choice. While research in many fields of social science has advanced the understanding of these principles over the years, a basic formulation of these principles first appeared in *Administrative Behavior* (Simon 1947).

Principle of Intended Rationality

Simon's model is enshrined in the crucial principle of intended rationality. It starts with the notion that people are goal-oriented but often fail to accomplish goals because of interactions between aspects of their cognitive architectures and the fundamental complexities of the environments they face (Simon 1976, xxvii; March 1994). Intellectually, this notion did not begin with Simon; it probably began with Vilfredo Pareto. In *Mind and Society* (1935), Pareto distinguished between logical, illogical, and nonlogical behaviors.² Logical behavior is rational choice; it is ends-means reasoning where means are appropriate to goals. Illogical behavior is behavior not rooted in ends-means thinking; Pareto thought little human behavior (at least of interest to a social scientist) was illogical. Nonlogical thought involved sentiment and emotion, which could interfere with logical thinking. We might then term the principle of intended rationality the Pareto-Simon principle.³

The principle of intended rationality implies that we look at the goal-directed behaviors of people and investigate the manner in which their cognitive and emotional constitutions concomitantly promote and interfere with goal-directed behaviors. It also implies, of course, that "rationality does not determine behavior. . . . Instead, behavior is determined by the irrational and nonrational elements that bound the area of rationality" (Simon 1947, 241).

² I thank Fred Thompson for drawing this link.

³ *Mind and Society* is a monumental and comprehensive work, often ponderous and intimidating. *Administrative Behavior* is direct and accessible. The nature of the vehicle can promote the idea.

The notion of bounded rationality has been confused with a lack of calculational ability. Lupia, McCubbins, and Popkin recently claimed that “Herbert Simon argued that, unlike *homo economicus*, people are not omniscient calculators—they do not do all of the calculations all of the time” (2000, 9). Simon, March, and Newell all stressed that calculations were a minimal part of the difficulty and were easily solved using notepads, calculating machines, or a bureau of accountants. Simon did write extensively, however, about attention, emotion, habit, and memory, and he explored the functionality and dysfunctionality of these aspects of the architecture of human cognition. It is true that a prime component of the behavioral model of choice is difficulty in planning and executing long behavioral sequences (Jones 2001, 61), but this aspect of the model should not be confused with calculational difficulties.

Principle of Adaptation

The principle of adaptation stems most directly from the studies of Newell and Simon on human problem solving and is best stated in Simon’s *The Sciences of the Artificial* (1996b). He claimed that most human behavior is explained by the nature of the “task environment.” Given enough time, human thought takes on the shape of the tasks facing it—that is, human thought is adaptive and basically rational. Simon stated that “there are only a few ‘intrinsic’ characteristics of the inner environment of thinking beings that limit the adaptation of thought to the shape of the problem environment. All else in thinking and problem-solving behavior . . . is learned and is subject to improvement” (1996b, 54). From this principle comes the inference that, in general, the more time a decision maker spends on a problem, the more likely his or her understanding of the problem will approximate the actual task environment and the limitations of human cognitive architecture fades (Newell 1990).

Psychologists today tend to stress the distinction between central and peripheral mental processing (Fiske and Taylor 1991, 475–80). Kuklinski and Quirk put it this way: “In central processing, used when attention and motivation are high, people employ more mental resources, think more systematically, and allow data to shape inferences. In peripheral processing, used when attention and motivation are low, they employ fewer resources, rely on simple heuristics, and use top-down, stereotypic inferences” (2000, 163).

Principle of Uncertainty

One of the major strategies of the rational choice approach in social science has been to understand uncertainty in light of the calculus of probabilities. It is possible now to speak of “expected utility” and think of outcomes as following a probability distribution. Unfortunately, this undeniable improvement does not come close to telling the entire story of human decision making. Students of human choice in the real world or in laboratory situations repeatedly find that people have great difficulties in working with probabilities, assessing risk, and making inferences when uncertainty is involved. Indeed, a whole field has emerged that studies the factors responsible for perceptions of risk; clearly these perceptions are not just rooted in “nature” but also involve human psychology.

An underlying tenet of bounded rationality from its early years centered on how human cognitive architecture interacted with an uncertain world; bounded rationalists saw uncertainty as far more fundamental to choice than the probability calculus implied (March 1994). If one’s understanding of the causal factors involved in a problem is hazy or ambiguous, then the uncertainty is not contained but reverberates through the entire thought process. If one is uncertain about how to specify outcomes, then one must also be uncertain about how to specify one’s utility function. I am not referring to probabilities associated with well-

specified outcomes; the probability calculus easily handles that. Simon termed this difficulty “the design problem” to denote the fundamental nature of specifying a space within which to solve problems. Addressing this reverberation and its impacts on organizational decision making is perhaps the key contribution of James March’s work.

Principle of Trade-Offs

It became evident very early in the study of human choice that people have a difficult time trading off one goal against another when making a choice (Slovak 1990; Tetlock 2000). The classical economic model depicts trade-offs as smooth indifference curves, and modern rational choice theory offers little new in the theoretical study of trade-offs. The first behavioral tool for understanding trade-offs was Simon’s notion of satisficing. His idea that a person within an organization chooses alternatives that are “good enough” led critics to claim that the notion was just a poverty-stricken version of maximization. Recently, for example, Lupia, McCubbins, and Popkin claimed that bounded rationality was consistent with maximizing behavior. They cited with approval Jensen and Meckling, who wrote that the use of the term *satisficing* “undoubtedly contributed to this confusion because it suggests rejection of maximizing behavior rather than maximization subject to costs of information and decision making” (2000, 9).

If one adds information and decision-making cost constraints to choice, this will not cause bounded rationality to dissolve into maximizing behavior. The reason is that satisficing describes the cognitive difficulties people have with trade-offs. As a consequence, satisficing has little to do with some sort of second-rate maximization approach. Because of limited attention spans, people generally work on goals sequentially. As a consequence, trade-offs among goals are very difficult. The response, argued Simon, was for people to set aspiration levels for the goals they wish to achieve. If a choice was good enough (that is, if it exceeded aspiration levels) for all goals, then it was chosen.

Other models of choice among multiple goals have been developed, including the lexicographic strategy (choose the strategy that maximizes gain on the most salient goal and ignore the rest) and elimination by aspects (use a lexicographic strategy unless there is a tie among alternatives; then and only then use a second goal to break the tie). People have considerable difficulty in trading off benefits against losses, which is something that standard utility maximization theory recognizes as straightforward (Kahneman and Tversky 1979).

The Behavioral Theory of Choice

While great strides have been made in recent years by psychologists and behavioral economists who study choices in controlled laboratory arrangements, only serious field study can indicate how choices are made in the structured yet dynamic environments of real-world situations. Bounded rationality and the behavioral theory of choice came from organization theory; indeed, March (1994) once noted that breakthroughs in the study of human cognition were likely to come from a study of organizations. Psychological and behavioral economics have focused almost exclusively on experimental studies and have suffered accordingly. Findings of systematic violations of principles of behavior based on expected utility calculation are dramatic and widespread (Camerer 1998; Camerer and Thaler 1995; Thaler 1991, 1992), yet this says little about choice in the field where behavior can be adaptive and responsive to multiple feedback streams (Laitin 1999).

Behavioral economists have called their writings “the anomalies literature” (Thaler

1988, 1992) because of their single-minded focus on experimental design and their rejection of various tenets of expected utility. Several political scientists have criticized experimental psychology and behavioral economics literature for their seeming ad hoc nature—they build findings experimental effect by experimental effect. They noted correctly that experimentation was a very soft foundation from which to study institutions and macropolitics. From another perspective, David Laitin (1999) properly noted that in everyday actions people were adaptive and avoided many of the traps set for them in experiments. But rather than explore the ramifications of this observation empirically, he jumped to the wholly unwarranted conclusion that people must be comprehensively rational.

There is no support for these and related lines of argument because the behavioral model of choice has been available since the late 1950s. It avoids the anomalies problem, is parsimonious, and, as I shall argue, yields more accurate predictions on aggregates than comprehensive rationality does.

Bounded rationality points to the limits of rational adaptation; behavioral choice theory provides a body of literature that shows how human choice works. As I noted above, bounded rationality and the associated behavioral theory of choice is open ended; we do not know everything about human choice, but we learn more every year. We do know enough to specify the outlines of what aspects of human cognition must be incorporated to formulate a general theory of human choice. I would cite the following:

1. *Long-term memory.* People learn by encoding direct or secondary experience into rules that specify actions to be taken in response to categories of stimuli.
2. *Short-term memory.* Human cognitive capacities include a “front end” that extracts features from the world around them, categorizes them as relevant or irrelevant (in the former case, they become stimuli), and prioritizes them.
3. *Emotions.* In an initial encounter with a choice situation, the major mechanism for weighting the relevance of stimuli is emotion.
4. *Central versus peripheral processing.* When attention and emotion are aroused, information processing shifts toward problem analysis and search. When they are not aroused, the decision maker relies on prepackaged solutions.
5. *The preparation-search trade-off.* If the front-end system indicates a need for action, people can take two paths: They can draw upon previously prepared and stored rules specifying how to respond to the category that a stimulus has been placed in, or they can search for new responses.
6. *Identification.* People identify emotionally with the previously prepared solutions they have encoded in memory. They become attached emotionally to their current repertoire of encoded solutions, even as the problems they face evolve.

Clearly these six aspects of human cognition do not tell the whole story. For example, in many cases in which attention and emotion are aroused, people may insist on following old rules. But these aspects cover much ground and lay the basis for a general behavioral theory of choice in organizations and institutions.

While organizations clearly free people by extending their capacities to achieve goals, they can also fall prey to aspects of human cognitive architecture in predictable ways. Major

aspects of the behavioral theory of organization mirror major facets of the behavioral theory of human choice.

1. *Organizational memory.* Organizations encode experiences into rules, routines, and standard operating procedures that specify actions to be taken in response to categories of stimuli.
2. *Agenda setting.* Organizational capacities include a “front end” that extracts features from the world, categorizes them as relevant or irrelevant (in the former case, they become stimuli), and prioritizes them. Agenda setting in organizations is similar to the short-term memory’s affect on human cognition.
3. *Parallel processing.* Organizations expand human capacities by providing people with the ability to process information in a parallel fashion. By decentralizing and delegating, organizations can process multiple streams of input simultaneously (Simon 1983; Jones 1994). This organizational strategy presupposes considerable “peripheral processing” that relies on preprogrammed solutions.
4. *Serial processing.* A search for new solutions is activated only when previously prepared solutions encoded in organizational routines are judged inadequate. Then organizations move from peripheral to central processing (or from parallel processing to serial processing).
5. *Emotional contagion.* In policy making, emotional commitment and contagion are crucial elements in mobilizing for major initiatives. Moving from parallel to serial processing is invariably accompanied by participants’ emotional arousal (Jones 1994).
6. *Identification.* People identify emotionally as well as cognitively with the organizations they participate in. This is a great resource for leaders. Having pride in performing a job can push people to actions that would be unthinkable in a calm cost-benefit analysis. But it can also make it difficult for leaders to shift strategies when they find it necessary to do so.

The relationships between organizational decision making and individual decision making are causal, not metaphorical (Jones 2001). One cannot really understand how organizations operate without a strong sense of how individuals process information and make decisions. As a consequence, a firm scientific foundation for policy studies must be rooted in a behavioral approach to organizations (see Green and Thompson 2001).

PREDICTION IN SCIENCE: INFERENCE FROM INDIVIDUAL BEHAVIOR TO COLLECTIVE CHOICE

Few social scientists today would disagree with Simon’s premise that a sound organizational theory must rest on a defensible theory of human behavior. Bounded rationality is more open ended in its basics than the rational model. How much should an unrealistic model of the behavioral underpinnings of collective choice that is nevertheless well specified be traded off against a model that is more realistic but less well specified? In making a judgment, we ought to apply scientific standards. Here the primary standard ought to be the

extent to which the model in question can be used to understand and predict collective choices.

Thick and Thin Rationality

Original formulations of rationality assumed self-interest, which can predict individual behaviors and collective choices. Often, however, people do not seem to act out of self-interest. Experimental studies have been unequivocal on the issue: In laboratory settings, many people do not act out of strictly selfish motives. Frolich and Oppenheimer found that “a substantial set of individuals consider the welfare of others as a value in itself” (2000, 106; for a review of this rich topic, see chapter 5 of Jones 2001).

As a consequence, a “thin” version of rationality was proposed to replace the incorrect “thick” version. Thin rationality ignores the postulate of goals and focuses only on the process—it assumes maximizing behavior regardless of what a person’s goals are. Unfortunately this theory leads nowhere because it generates no specific predictions about behavior (Simon 1985). If people have goals that reflect both self-interest and the welfare of others, and formal theorists have no ways of specifying the trade-offs, then no predictions can be made. In the famous “divide the dollar” experiments, in which subjects were asked to divide a prize between themselves and others, specific predictions were made using the postulate of thick rationality, but any division was consistent with the postulate of thin rationality.

To make predictions we would need to study the formation of the reasons people use for the decisions they make. This is equivalent to exploring preference formation and doing it inductively because there are no a priori reasons (on the part of the investigator) for assuming any particular set of reasons (on the part of the subject). If we are going to go this far, why not treat the mechanisms of choices as subject to empirical study, rather than assuming maximization given the unspecified set of reasons used by the decision maker?

Process or Outcome Predictions?

Predictions can be made based on processes or on outcomes. It has traditionally been conceded by proponents of rational choice that the approach was insufficient to predict processes but that it mattered little. The instrumental positivist position, first articulated by Milton Friedman, insisted that predictions are made not on processes but on outcomes (Friedman 1996). Outcome predictions are satisfactory when decision makers act as if they are rational maximizers. Bounded rationality insists that these processes matter and that successful science must properly link the process of individual decision making to organizational processes responsible for collective choices. If that is done successfully, then the outcome predictions will take care of themselves.

The first set of serious predictions using bounded rationality to study public policy came from the budget studies of Wildavsky (1964) and his colleagues and Fenno (1966).⁴ Explicitly relying on bounded rationality, these scholars reasoned that budgets ought to be incremental, supported by organizational decision-rules that would stabilize the environment for participants. They examined the process of budgeting directly, and they examined the pattern of budgetary outcomes.

⁴ Wildavsky 1964 relied in part on data from Fenno, later published in 1966. In his introduction (1966, xxiv), Fenno described all of the major organizational changes that were eliminated from his data set. Incorporating these changes implies a far different budgeting process.

The problem is that public budgets are not incremental, at least when viewed from a long-enough time span or in a broad-enough sample (True 2000; Jones, Baumgartner, and True 1996). The processes underlying incremental budgeting may have been misspecified (Padgett 1980, 1981). Indeed, new budgetary studies, based on outcome predictions but reliant on a proper appreciation of organizational processes, pointed to a glaring omission in earlier budget studies. Focused as they were on organizational procedures that stabilize and make predictable a potentially chaotic environment, earlier studies missed how organizations cope with unexpected change.

There are times when organizations must adjust their standard operating procedures to address signals from the environment that simply cannot be placed within preexisting categories. Padgett's (1980, 1981) examination of federal budget routines found that sequential search for acceptable alternatives under conditions of changing political constraints would yield punctuated change.⁵ Carpenter (1996) showed that federal agencies often ignore the budgetary signals sent by Congress unless those signals are sent repeatedly. The first attempt to cope with a radically changing environment seems to be to use the preexisting set of rules; only when it becomes clear that the signals cannot be ignored will an agency respond (at the cost of considerable disruption to internal procedures).

Similarly, the FDA's shift from a priority of protecting public health to one of promoting as well as protecting health had characteristics of a punctuated equilibrium (Cecconi 2003). In any case, a smooth response to the problem was not possible because old decision-rules had to be abandoned and replaced by new ones. This leads to episodic, disjointed behavior.

While the early budget studies had much of the budgeting process right, they didn't properly appreciate the role of shifting attention. The allocation of attention is a critical component of agenda-setting studies (Cohen, March, and Olsen 1972; Kingdon 1996; Baumgartner and Jones 1993). Attention shifts in policy making imply changes in standard operating procedures, which in turn predict major punctuations in policy outcomes. So policy outcomes should be characterized by periods of stability or incremental adjustment that are punctuated by periods of rapid change. Further, both stability and change should be more pronounced than the information coming in to the organization (or, more generally, the policy subsystem); that is, whatever the information flow, a model of organizational processes based in bounded rationality predicts a more episodic process in outcomes. Both individuals and organizations are disproportionate information processors when they ignore many signals in the environment until they must overreact (Jones 2001).

ATTENTION-DRIVEN CHOICE IN POLITICAL SCIENCE AND PUBLIC ADMINISTRATION

A political science relying on behavioral choice theory will invariably be drawn toward the study of information processing and problem solving. It will be somewhat less focused on questions of equilibrium and control, because these subjects have been attended to far out of proportion to their explanatory power. The nature of behavioral assumptions influences the choice of topics for study.

⁵ Padgett's work on budgeting was based in organizational processes and developed a decisional mechanism that implied not solely incremental budgetary outputs. These insights did not result in further understanding of the bounded rationality base of budgeting for a decade and a half, testimony to the lags in adaptation in the research enterprise.

To illustrate my point, I turn to the study of public administration. Public administration was once at the very vital core of political science—it is, after all, where the great postwar debates about rationality and democratic control of policy making were first vigorously pursued. The quality of recent scholarship on public administration may indicate a reemergence of the field.

But there is a vast difference. The early students of public administration were concerned with how organizations and democracy were intermeshed or whether a pluralism of interests generated by Roosevelt's "alphabet soup" of regulatory agencies could fit with a single overhead control model of democracy. On the contrary, much recent high-quality scholarship has collapsed into the single issue of control—and control solely through formal incentives (primarily punishment). The rich insights of behavioral choice have devolved into a discredited Skinnerian psychology, where the incentive controls the behavior.⁶

This is a clear instance of attention-driven choice. The fascination with principal-agent models and the force-fitting of them into complex legislative, executive, and bureaucratic interactions has occupied such a disproportionate amount of attention that it has come close to excluding the traditional broad-gauged questions that dominated the postwar field.

Principal-Agency

The modern literature on public administration indicates that the primary problem—perhaps the only problem—for the study of bureaucracy is control. Bureaucrats seem to spend their lives avoiding doing what superiors want them to do. The primary theoretical vehicle for this extensive line of research is the principal-agent model. This model is based on asymmetric information—an agent has more information than a principal in his or her area of expertise and will invariably use that information to cheat the principal unless formal incentives are in place to make sure that this does not happen.

The model was developed for such situations as when a company hired an accountant, but it has been adapted enthusiastically to the study of legislative-bureau relationships. Strangely enough, the model seems to have been more popular in the United States, where the separation of powers makes the model problematic, than in parliamentary systems, where it may well be more relevant. There are two major problems with this model: (1) it is based on an antiquated model of human behavior (basically Skinnerian psychology), and (2) its incredible popularity has led to a vast overinvestment of scholarly resources in the study of control to the exclusion of other worthy topics.

The adoption of an antiquated (or incorrect) model of human behavior has led to truly strange circumstances in the field. Models based on principal-agency have big problems in confirmation (see Brehm and Gates 1997; Balla 1998; Carpenter 1996; Balla and Wright 2001). Most interesting is Brehm and Gates's commentary that "the primary contribution is . . . our finding of the overwhelming importance of attributes of the organizational culture in determining subordinates' levels of compliance" (1993, 578). This is surprising (as Brehm and Gates are well aware) only if one begins with a bad model. Organizational culture is no longer some sort of residual variable but a powerful component of properly formulated analyses (Miller 1992).

What does one do if one finds a general lack of confirmation of the purest principal-agent models in government agencies? The "as if" school of thought requires disconfirmation.

⁶ It is ironic that Skinner's study of pigeons and mice and the comprehensive rationality of economics both lead to the same impoverished model of human choice: Only formal incentives matter.

What do we disconfirm? That control in organizations is not relevant? That the principal-agent distinction is not valid? That asymmetric information does not occur in bureaucracies? All of these would be silly but are required by followers of Milton Friedman. What is not valid is the outmoded model of human behavior that the principal-agent model is based on. Get rid of the antiquated assumption, and a better perspective on the role of control in bureaucracies emerges.

Administrative Procedures

Perhaps in no other area of public administration has more effort been directed in an inefficient fashion than in the “deck stacking” thesis of McCubbins, Noll, and Weingast (1987). This theory even comes with its own pet name: “McNollgast.” As is usual in principal-agent-based theorizing, Congress is obsessed with the control of bureaucrats and sets up administrative procedures to empower interests comprising the majority coalition. Yet key components of the Administrative Procedures Act of 1946 require “notice and comment” before the issuance of regulations.

On the face of it, this looks more like issuing rules to stabilize an uncertain environment, maybe even solving the problem of every debate about regulations being appealed to Congress.⁷ Organizational routines focus attention toward certain aspects of the environment and exclude others, and these routines also regularize the responses to environmental stimuli. It has always been assumed that such rules may carry a bias, but the empirical documentation of such bias (outside of the questionable bias of allowing the interested the opportunity to participate in a democracy) has been difficult.⁸ In any case, good science would have required the explicit exclusion on theoretical or empirical grounds before leaping to an overhead control model.

If McNollgast was poor science, at least it was a compelling and innovative hypothesis. One wonders why, given the extraordinary attention this piece received, no scholar pointed out its inconsistencies or the inconsistencies of other hypotheses from behavioral organization theory.

Principal-Agency, Deck Stacking, and Sound Science

The focus on principal-agency at the expense of more scientifically based perspectives is a selection device. It leads directly to an overemphasis on control as well as other important mistakes. These include

1. *Isolating out one motive from a panoply of those that drive congressional behavior.* If members of Congress are focused fundamentally on reelection, then the right question is how they balance (or trade off) the various means that could lead to that goal. One way could be controlling bureaucratic behavior. The behavioral model of choice would insist that this balancing is accomplished via attentional mechanisms. How various means to goals get activated is a critical component of choice, but this is completely ignored in the congressional literature.

⁷ I thank Gary Miller for pointing this out.

⁸ This was exactly the question that motivated the urban service distribution literature of the 1970s and 1980s. The consensus drawn from numerous empirical studies was that services were delivered according to decision-rules that favored those willing to make routine demands on government; see Jones 1980, Linberry 1977, Mladenka 1978.

2. *Ignoring the fundamental role of uncertainty.* Behavioral choice implies that uncertainty in decision making is fundamental. In principal-agent relations, uncertainty is fundamental to both parties. Complaining that the principal-agent model fails to specify how agencies make decisions, George Krause (2003, 186) notes that uncertainty is treated similarly as an assumption or an afterthought. His work suggests that it is fundamental to the process. Most problems that matter in agency decision making are not the well-structured ones of formalistic analysis but ill-structured ones that infuse uncertainty throughout the decision-making process.
3. *Dismissing aspects of “organizational culture,” in particular the well-documented phenomenon of “identification with the means.”* Start with a principal-agent formulation based on a discredited microfoundation, and invariably the result is a call to study the internal dynamics of agencies. Start with a more robust microfoundation of behavior, and a more robust organizational analysis emerges.

Attention-Driven Choice and Identification with the Means in Public Agencies

The basis for the behavioral model of choice is the processing of information. Information is not predefined or prepackaged; rather it is often vague, ambiguous, and, most importantly, generated from multiple sources. Unlike the equilibrium-based analyses of principal-agent, it is dynamic. The receiver of the information is as important as the sender (Jones 2001).

An information-processing perspective leads to a richer and more scientifically sound approach to public policy and public administration than the cramped and formalistic control perspective currently in vogue in the field. In modern complex environments, neither individuals nor organizations respond simply to stimuli. They must attend, prioritize, and select an appropriate response. As a consequence, there is no clear, one-to-one mapping between potential stimuli or events and actions.

A major key to understanding information processing in people and organizations is the allocation of attention. A few examples illustrate how an information-processing approach compares with the current principal-agent fascination.

In the Inspector General’s Office of the Social Security Administration, investigators in field offices study complaints of illegalities and choose whether to proceed against the alleged perpetrators. The central office is crystal clear about how to prioritize crimes: Move against those that will return the most money to the U.S. Treasury. Individual investigators may decide what cases are likely to bring the largest return, but they have no discretion to substitute their priorities for those of the central office. Of course control cannot be insured except through some type of records or on-site monitoring. So it looks like a classic principal-agent delegation-type problem.

However, it is not as it seems. If field offices followed the central dictate to the letter, organizational chaos would be the most likely result. In effect, the central office does not want the announced priority system to be followed. When a “hot” case, one with some degree of media interest, emerges, the old priorities are not valid. If a criminal cheats a handful of widows of their Social Security checks, causing destitution on a small scale, the agency cannot defend itself through its control mechanisms. Able agents quickly realize that the argument about preventing potentially hot cases from exploding could act as a defense

against charges that they were violating central office policy. If central control were pursued to the exclusion of anticipatory problem solving, punishing those showing initiative, soon the agency would devolve into a pathological one, incapable of responding to changing circumstances. In effect, most managers do not really want control. They want adaptive information processing.⁹

In his study of municipal budgeting, John Crecine (1969) noted that city agencies developed attention rules, which indicated what aspects of the environment ought to be monitored for indicators of change that could need addressing. These rules did not tell the agency what to do, only what to attend to. Similarly Jones (1985) found in a study of Chicago building-code enforcement that informal norms generally supplanted the complexities of the code, but that supervisors occasionally sent out signals to field inspectors that all violations were to be recorded in potentially hot cases. These cases, usually when there was party, neighborhood group, or media interest, simply generated better code enforcement than the bulk of cases. Differential code enforcement resulted as a consequence of these attention rules.

Research by Armstrong, Carpenter, and Hojnacki (2003) indicates that media attention to disease is not simply related to mortality and morbidity. This attention seems to mediate output indicators, such as investment in cures and related science. The designation of a hot disease has characteristics of a disjointed response to objective disease characteristics.

Attention is different from any other resource type variable because one cannot allocate it proportionally to one's priorities at any one time. Attention is selective; select one aspect of an environment for study and inattention must be paid to the rest of the environment. Attention is partially under the control of a decision maker, but cognitively that decision maker possesses no comprehensive system for monitoring when enough attention has been devoted to a topic. As a consequence, shifts in attentiveness are in large part due to emotional arousal. Attention shifts are governed by emotion, so they are unavoidably disrupted. Past decisions are a residue of past allocations of attention because, in many cases, the devotion of other resources follows attention. Decisions may or may not be consistent—great inconsistencies in choices are a result of the level of attention.

Identification with the Means

Bound up with any change in decision-rules is identification with the means rather than ends, a key factor in policy choice and implementation (and first isolated as a key aspect of organizational behavior by Simon in *Administrative Behavior*). People in organizations identify emotionally and cognitively with operating procedures, and this nonrational process compounds the disjointed adjustment behavior in bureaus.

In one of the last pieces Simon published, he and Ronald Fernandes (1999) applied the process-tracing methodology initially developed by Newell and Simon (1972) in their problem-solving experiments to the complex and ill-structured problems characteristic of policy issues. Fernandes and Simon showed that the initial problem-solving experiments studied well-specified problems, but the methods themselves are adaptable to less-structured situations. They wondered if the professional identifications led to different problem-solving strategies. One intriguing finding was the dominance of a Know → Recommend strategy among many participants, which hindered their use of information in problem solving.

⁹ This example is based on an undergraduate student paper. Interestingly, the SSA refused to allow the development of this example into an extended paper for publication.

Ill-structured problems lend themselves to the application of prepackaged solution sets (Jones and Bachelor 1993) that participants bring to the problem-solving enterprise. These solution sets can derive from ideology, professional identification, or current organizational practices. Whatever the source, these solution sets suggest a major limitation in one of the fundamental principles of bounded rationality—what I named the principle of adaptation. However, this principle operates away from comprehensive rationality, and it cannot be construed as some sort of heuristic shortcut for limiting search costs. It may be in moderation, but current studies suggest that it is overused to the point of interfering with adaptation. This is an important finding capable of being linked to collective decision making (see Brown 2001). The operation of a Know → Recommend strategy will compound even further disjointed responses of public bureaus and other organizations to information.

BOUNDED RATIONALITY AND STOCHASTIC PROCESSES

Because of the disproportionate information processing described above, the traditional approaches to analysis based on point prediction and regression analysis can be misleading. It is too difficult (and perhaps meaningless) to try to tie a particular event to a particular outcome. Students of organizational processes have begun to make use of stochastic process approaches, in which efforts are made to understand the processes underlying an entire distribution of outputs rather than a particular response to a policy innovation or other change (Padgett 1980, 1981; Jones, Sulkin, and Larsen 2003). These processes characterize municipal and national budgeting in the United States (Jordan forthcoming; True, Jones, and Baumgartner 1999), national budgeting in the United Kingdom (John, Margetts, and Gilbert 2001), and school expenditures in Texas (Robinson 2003). In particular, the stochastic process approach predicts leptokurtic distributions in outputs regardless of the input distribution—that is, punctuations will occur when the normal organizational routines for processing information break down (Jones 2001; Jones, Sulkin, and Larsen 2003).

The stochastic process approach captures predictions from bounded rationality and organizational processes better than the common intervention-response models used today in policy analysis and public administration. It eschews point prediction for a more comprehensive examination of full distributions. It follows the logic of extreme value theory, a stochastic process approach that requires that the tails of the distribution be taken seriously, not just the mean and variance, because these major punctuations can disrupt equilibria (Sornette 2000).

Bounded rationality and behavioral choice lead to predictions about policy outcomes that imply that organizational outputs will be disjointed and episodic regardless of the input stream and the cost structure of the organization. It is clear that decision costs in the policy-making process can cause disjointed outputs. For example, in the U.S. system of separated powers, considerable changes in the preferences of policy makers can occur without producing policy changes because of the need to assemble majorities in all responsible branches (Hammond and Miller 1987). If these “decision costs” were discounted, bounded rationality implies that disorderly and episodic behavior would still occur. Examination of a number of different distributions of outcomes from U.S. political institutions and their policy-making processes finds that, regardless of the institutional cost structure, outputs are punctuated (Jones, Sulkin, and Larsen 2003).

In the current incarnation of rational models, people act proportionately to the information they receive. They attend to everything simultaneously and make trade-offs effortlessly.

They avoid punctuated outputs except where inputs are disjointed and episodic. Organizations composed of rational participants respond directly and efficiently to information discounted by costs. Organizations composed of boundedly rational participants cannot avoid punctuated outputs because they cannot adjust their behaviors to incoming information of any degree of complexity.

CONCLUDING COMMENTS

In his commentary for the fiftieth-anniversary celebration of the signing of the Declaration of Independence, John Adams wrote that the United States was “destined in future history to form the brightest or blackest page, according to the use and abuse of those political institutions by which they shall in time come to be shaped by the *human mind*” (quoted in Ellis 2000, 247). To Adams there were no guarantees of good government in the design of institutions. Human history was messy and contingent, and the human mind creative.

Science similarly is not neat, no matter how much the formalists would like to pretend differently. Formalistic analyses based in an anachronistic model of human behavior, such as rational maximization in economics and other social sciences, fail in the most important standard: satisfactory prediction. Only an incomplete and immature science can rest on an unrealistic microfoundation, as rational analysis requires. Imagine a physicist interested in the mathematics of subatomic particles but uninterested in finding empirical evidence of them, or a biologist uninterested in observing genes. That is what the “as if” school of analysis in effect asks us to do.

Simon was a crucial figure in the development of a sound basis for the study of human choice; by 1958 the outlines of this model were fundamentally complete.¹⁰ We have made great progress in understanding human choice and its implications for the study of public policy and public administration since then, but the “rational choice controversy” continues to plague social science. As Simon did from 1945 until his death in 2001, I continue to advocate a solid behavioral base for the analysis of political and economic systems. This perspective leads invariably to a public administration and public policy oriented more toward the dynamics of information processing and away from a fascination with control.

REFERENCES

- Armstrong, Elizabeth M., Dan Carpenter, and Marie E. Hojnacki. 2003. Whose deaths matter?: Attention to disease in the public arena. Paper presented at the Conference on the Politics of Biomedical Research, March, Woodrow Wilson School of Public and International Affairs, Princeton University.
- Balla, Steven J. 1998. Administrative procedures and political control of the bureaucracy 1998. *American Political Science Review* 92:663–73.
- Balla, Steven J., and John R. Wright. 2001. Interest groups, advisory committees, and congressional oversight. *American Journal of Political Science* 45:799–812.
- Baumgartner, Frank R., and Bryan D. Jones. 1993. *Agendas and instability in American politics*. Chicago: University of Chicago Press.
- Brehm, John, and Scott Gates. 1993. Donut shops and speed traps: Evaluating models of supervision on police behavior. *American Journal of Political Science* 37:555–81.
- . 1997. *Working, shirking, and sabotage*. Ann Arbor: University of Michigan Press.

¹⁰ To the end of his life, Simon insisted that he was a “member of the tribe”; see Simon 1999.

- Brown, Steven R. 2001. Structural and functional information: A cautionary note to Fernandes and Simon. Paper presented at the annual meeting of the Society for the Policy Sciences, New Haven, Conn.
- Camerer, Colin F. 1998. Behavioral economics and nonrational organizational decision making. In *Debating rationality: Nonrational aspects of organizational decision making*, edited by Jennifer J. Halpern and Robert N. Stern. Ithaca, N.Y.: Cornell University Press.
- Camerer, Colin F., and Richard F. Thaler. 1995. Ultimatums, dictators, and manners. *Journal of Economic Perspectives* 9:209–19.
- Carpenter, Daniel. 1996. Adaptive signal processing, hierarchy, and budgetary control in federal regulation. *American Political Science Review* 90:283–302.
- Ceccoli, Stephen. 2003. Policy punctuations and regulatory drug review. *Journal of Policy History* 15:158–91.
- Cohen, Michael, James G. March, and Johann Olsen. 1972. A garbage can model of organizational choice. *Administrative Science Quarterly* 17:1–25.
- Crecine, John. 1969. *Government problem solving*. Chicago: Rand-McNally.
- Ellis, Joseph. 2000. *Founding brothers*. New York: Vintage.
- Fenno, Richard. 1966. *The power of the purse*. Boston: Little, Brown.
- Fernandes, Ronald, and Herbert A. Simon. 1999. A study of how individuals solve complex and ill-structured problems. *Policy Sciences* 32:225–45.
- Fiske, Susan, and Shelly Taylor. 1991. *Social cognition*. New York: McGraw-Hill.
- Friedman, Jeffrey. 1996. Introduction: Economic approaches to politics. In *The rational choice controversy: Economic models of politics reconsidered*, edited by Jeffrey Friedman. New Haven, Conn.: Yale University Press.
- Frolich, Norman, and Joe Oppenheimer. 2000. How people reason about ethics. In *Elements of reason: Cognition, choice, and the bounds of rationality*, edited by Arthur Lupia, Mathew D. McCubbins, and Samuel L. Popkin. Cambridge, Mass.: Cambridge University Press.
- Green, Mart T., and Fred Thompson. 2001. Organizational process models of budgeting. In *Research in public administration: Evolving theories of budgeting*, edited by John Bartle. San Francisco: JAI Press.
- Hammond, Thomas, and Gary J. Miller. 1987. The core of the constitution. *American Political Science Review* 81:1155–74.
- John, Peter, Helen Margetts, and Daniel Gilbert. 2001. Rollercoaster budgeting in the U.K.: Fluctuations and equilibria in U.K. central government programme expenditures since 1945. Paper presented to the European Consortium for Political Research, Kent, U.K.
- Jones, Bryan D. 1980. *Service delivery in the city: Citizen demand and bureaucratic response*. New York: Longman.
- . 1985. *Governing buildings and building government: A new perspective on the old party*. Tuscaloosa: University of Alabama Press, 1985.
- . 1994. *Reconceiving decision making in democratic politics*. Chicago: University of Chicago Press.
- . 2001. *Politics and the architecture of choice*. Chicago: University of Chicago.
- . 2002. Bounded rationality and public policy: Herbert A. Simon and the decisional foundation of collective choice. *Policy Sciences* 35:269–84.
- . 2003. Attention-driven choice and the behavioral foundations of public administration. Paper presented to the Midwest Caucus of Public Administration, April, Chicago, Illinois.
- Jones, Bryan D., and Lynn W. Bachelor. 1993. *The sustaining hand*. 2d ed., rev. Lawrence, Kans.: University Press of Kansas.
- Jones, Bryan D., Frank R. Baumgartner, and James L. True. 1996. The shape of change: Punctuations and stability in U.S. budgeting, 1947–94. Paper presented at the annual meeting of The Midwest Political Science Association, Chicago, Illinois.
- Jones, Bryan D., Tracy Sulkln, and Heather Larsen. 2003. Punctuations in political institutions. *American Political Science Review* 97:151–69.
- Jordan, Meaghan. Forthcoming. Punctuations and priorities: Local government expenditures. *Journal of Policy Analysis and Management*.

- Kahneman, Daniel, and Amos Tversky. 1979. Prospect theory: An analysis of decision making under risk. *Econometrica* 47:263–91.
- Kingdon, John. 1996. *Agendas, Alternatives, and Public Policies*. 2d ed. Boston: Little, Brown.
- Krause, George. 2003. Coping with uncertainty: Analyzing risk propensities of SEC budgetary decisions, 1949–97. *American Political Science Review* 97:171–88.
- Kuklinski, James, and Paul Quirk. 2000. Reconsidering the rational public: Cognition, heuristics, and mass opinion. In *Elements of reason: Cognition, choice, and the bounds of rationality*, edited by Arthur Lupia, Mathew D. McCubbins, and Samuel L. Popkin. Cambridge, Mass.: Cambridge University Press.
- Laitin, David. 1999. Identity choice under conditions of uncertainty: Reflections on Selten's dualist methodology. In *Competition and cooperation: Conversations with Nobelists about economics and political science*, edited by James Alt, Margaret Levi, and Elinor Ostrom. New York: Russell Sage.
- Linberry, Robert. 1977. *Equality and public policy: The distribution of municipal public services*. Beverly Hills, Calif.: Sage.
- Lupia, Arthur, Mathew D. McCubbins, and Samuel L. Popkin. 2000. Beyond rationality: Reason and the study of politics. In *Elements of reason: Cognition, choice, and the bounds of rationality*, edited by Arthur Lupia, Mathew D. McCubbins, and Samuel L. Popkin. Cambridge, Mass.: Cambridge University Press.
- March, James. 1994. *A primer on decision-making*. New York: Free Press.
- March, James, and Herbert A. Simon. 1958. *Organizations*. New York: John Wiley.
- McCubbins, Mathew, Roger Noll, and Barry Weingast. 1987. Administrative Procedures As Instrument of Political Control. *Law, Economics, and Organization* 3:243–77.
- Miller, Gary. 1992. *Managerial dilemmas: The political economy of hierarchy*. Cambridge: Cambridge University Press.
- Mladenka, Kenneth. 1978. Rules, service equity, and distributional decisions. *Social Science Quarterly* 59:192–202.
- Newell, Allen. 1990. *Unified theories of cognition*. Cambridge, Mass.: Harvard University Press.
- Newell, Allen, and Herbert A. Simon. 1956. The logic theory machine. *IRE Transactions on Information Theory* 3:61–79.
- . 1958. Elements of a theory of human problem solving. *Psychological Review* 65:151–66.
- . 1972. *Human problem solving*. Englewood Cliffs, N.J.: Prentice-Hall.
- Newell, Allen, J.C. Shaw, and Herbert A. Simon. 1957. Empirical explorations of the logic theory machine. *Proceedings of the Western Joint Computer Conference* 7:101–8.
- Padgett, John F. 1980. Bounded rationality in budgetary research. *American Political Science Review* 74:354–72.
- . 1981. Hierarchy and ecological control in federal budgetary decision making. *American Journal of Sociology* 87:75–128.
- Pareto, Vilfredo. 1935. *Trattato di sociologia generale* (Mind and society). Ed. Arthur Livingston. New York: Harcourt, Brace.
- Robinson, Scott. 2003. Punctuated equilibrium, bureaucratization, and budgetary changes in schools. Paper presented at the Midwest Political Science Association, 4–6, April, Chicago, Illinois.
- Simon, Herbert A. 1947. *Administrative behavior: A study of decision-making processes in administrative organization*. New York: Macmillan.
- . 1955. A behavioral model of rational choice. *Quarterly Journal of Economics* 6:99–118.
- . 1957. *Models of man*. New York: Wiley.
- . 1983. *Reason in human affairs*. Stanford, Calif.: Stanford University Press.
- . 1985. Human nature in politics: The dialogue of psychology with political science. *American Political Science Review* 79:293–304.
- . 1996a. *Models of my life*. Cambridge, Mass.: MIT Press.
- . 1996b. *The sciences of the artificial*, 3d ed. Cambridge, Mass.: MIT Press.
- . 1999. The potlatch between political science and economics. In *Conflict and cooperation: Conversations with Nobelists about economics and political science*, edited by James Alt, Margaret Levi, and Elinor Ostrom. New York: Russell Sage.

- Slovak, Paul. 1990. Choice. In *Thinking: An invitation to cognitive science*, vol. 3, edited by Daniel N. Osherson and Edward E. Smith. Cambridge, Mass.: MIT Press.
- Sornette, Didier. 2000. *Critical phenomena in natural sciences*. Berlin: Springer.
- Thaler, Richard H. 1988. Anomalies: The ultimatum game. *Journal of Economic Perspectives* 2:195–206.
- . 1991. *Quasi rational economics*. New York: Russell Sage.
- . 1992. *The winner's curse: Paradoxes and anomalies of economic life*. Princeton, N.J.: Princeton University Press.
- Tetlock, Philip. 2000. Coping with trade-offs: Psychological constraints and political implications. In *Elements of reason: Cognition, choice, and the bounds of rationality*, edited by Arthur Lupia, Mathew D. McCubbins, and Samuel L. Popkin. Cambridge, Mass.: Cambridge University Press.
- True, James L. 2000. Avalanches and incrementalism: Making policy and budgets in the United States. *American Review of Public Administration* 30:3–18.
- True, James L., Bryan D. Jones, and Frank R. Baumgartner. 1999. Punctuated equilibrium theory. In *Theories of the policy process*, edited by Paul Sabatier. Boulder, Colo.: Westview.
- Wildavsky, Aaron. 1964. *The politics of the budgetary process*. Boston: Little, Brown.