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ABSTRACT

Research both in cognitive psychology and psychobiology suggests that political behavior is often less rational than individuals believe it to be. Information processing, memory, and decision making are interlinked processes. Studies in cognitive psychology reveal that even though decision making requires rationality, individuals often adopt shortcuts (heuristics) in decisional processes. For example, people tend to remember instances which confirm their beliefs; make decisions based on the most easily accessible information stored in their memories; generalize on the basis of small samples; attribute other people's behavior to predispositions rather than consider the situation; and exhibit overconfidence in their conclusions. Further, psychobiological theories speculate that these heuristics probably operate below the conscious level; the outputs (decisions) made on an unconscious level then become accepted as valid thought during conscious thought processes. Research also indicates that both the masses and the politically elite (trained scientists) are susceptible to the use of heuristics and poor information processing. The costs may be high in many political decisions, especially when leaders are convinced they are behaving rationally. (Author/KC)

NEUROPHYSIOLOGY AND RATIONALITY IN POLITICAL THINKING

by

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This essay examines the age old problem of rationality in the human political realm from a biocognitive perspective. A standard model of human information processing and memory is presented to indicate how individual's "flow of information" and decision-making may be distorted. Shortcuts (heuristics) in human decision making are discussed. The paper notes that memory and decision-making are interlinked processes; evidence suggests common shortcomings. Then, speculative possible neurophysiological bases are summarized. These suggest a facilitative biological underpinning to human cognitive processes. Finally, the foregoing is applied to both mass and elite political thinking and behavior. The paper concludes that there is considerable room for the nonrational to play a significant role in political thinking and behavior.

NEUROPHYSIOLOGY AND RATIONALITY IN POLITICAL THINKING*

I. Introduction

A. Thesis

To what extent is homo sapiens rational? Political thinkers have debated this question literally millennia. In this essay, I argue that existing knowledge in cognitive psychology, when coupled with psychobiological findings and speculation, suggests that a rather pessimistic answer is probable, i.e. humans consistently over-estimate their rational abilities. Furthermore, the implications for politics seem to be significant.

B. Rationality

Webster's New International Dictionary says that to reason is to (1927:1779) ". . .draw inferences and reach conclusions from a consideration of data or premises. . . ." This is similar to L.J. Cohen's reference to human rationality as (Cohen, 1981:317) ". . .validity in deductive or probabilistic reasoning. . . ." In addition, Carl Hempel argues that (1965:464) ". . .an action will qualify [as rational] if, on the given information, it offers optimal prospects of achieving its objectives." Taken together, these views suggest three elements in the process: (1) drawing inferences; (2) use of deductive or statistical reasoning; (3) optimizing the odds of a successful outcome. Irving Janis and Leon Mann indicate seven criteria which define a "rational" decision making process (and, I should add, their view is fairly representative) (1977:11):

> The decision maker, to the best of his ability and within his information-processing capabilities
> 1. thoroughly canvasses a wide range of alternative courses of action;
> 2. surveys the full range of objectives to be fulfilled and the values implicated by the choice;
> 3. carefully weighs whatever he knows about the costs and risks of negative consequences, as well as the positive consequences, that could flow from each alternative;

4. intensively searches for new information relevant to further evaluation of the alternatives;
5. correctly assimilates and takes account of any new information or expert judgment to which he is exposed, even when the information or judgment does not support the course of action he initially prefers;
6. reexamines the positive and negative consequences of all known alternatives, including those originally regarded as unacceptable, before making a final choice;
7. makes detailed provisions for implementing or executing the chosen course of action, with special attention to contingency plans that might be required if various known risks were to materialize.

One might wish to add another: that the decision maker, after having rendered a decision, monitors feedback and, if necessary, adjusts the decision to take account of that feedback. The more that human decisions meet these various criteria, the more rational they are.[1]

C. Reason in Political Thought

From the Greeks to the present, one common theme linking many Western thinkers has been confidence in human rationality.[2] Plato, in his Republic, argued that, with proper training, those who had the inherent talent could come to apprehend reality, the forms behind the illusions. He contended that one part of the soul is rational; this part should rule. However, only among the philosopher-kings would reason's dominance be manifest. The Stoics asserted that humans, alone among living beings, have reason through which to understand the "law of the world-city" as well as that of their own individual cities. Upon this foundation, Cicero constructed his philosophical edifice. He stated (Sabine, 1961:164):

> There is in fact a true law -- namely, right reason -- which is in accordance with nature, applies to all men, and is unchangeable and eternal. By its commands this law summons men to the performance of their duties; by its prohibitions it restrains them from doing wrong.

In light of this eternal law, all men are equal, in that they all possess reason. He noted (Quoted in Sabine, 1961:165):

> Out of all the material of the philosophers' discussions, surely there comes nothing more valuable than the realization that we are born for Justice, and that right is based, not upon man's opinions, but upon Nature. This fact will immediately be plain if you once get a clear conception of man's fellowship and union with his fellow-men. For no single thing is so like another, so exactly its counterpart, as all of us are to one another. Nay, if bad habits and false beliefs did not twist the weaker minds in whatever direction they are inclined, no one would be so like his own self as all men would be like all others.

St. Thomas Aquinas continued this tradition[3] of faith in human rationality. He asserted that Human Law is a standard set by reason. Similarly, Grotius later appealed to reason as the basis for formulating laws.

English thinkers from Richard Hooker to John Locke expressed faith in human reason. Thomas Hobbes believed that, while humans were influenced by egoistic instincts, they also had reason. Reason, in fact, was the route by which humans could escape Hobbes' dreary state of nature. He said in Leviathan that "A law of nature is a precept, or general rule, found out by reason. . . ." James Harrington, John Milton, and Algernon Sidney had a less authoritarian perspective than Hobbes, but they shared his belief in human rationality. Among French thinkers, Voltaire, Helvetius, Holbach, Condorcet, and Diderot all believed in human rationality.

The recent development of liberalism has been largely based on confidence in humans' rationality. Twentieth century liberalism advocates governmental social intervention and experimentation to solve difficult problems; this is based on the prior assumption of sufficient rationality to carry out successful social engineering.

Furthermore, much ongoing political practice is based on the rationality assumption: innumerable five-year plans devised by Soviet leadership;

Mao's "great lead forward" and his "Great Proletarian Cultural Revolution"; Lyndon Johnson's "War on Poverty." In each case, leaders were serenely confident in their ability to guide change. Whether their self-confidence was rewarded is a separate question.

However, there has been another strand of thought which is more pessimistic about humans' rational capabilities. Some pre-Socratic thinkers expressed grave doubts.[4] Protagoras, for example, noted that (Smith, 1956: 60) "Man is the measure of all things, of things that are that they are, and of things that are not that they are not." He also argued that (Smith, 1956:60) ". . .many are the obstacles that impede knowledge, both the obscurity of the question and the shortness of human life." Gorgias is credited with having observed that (Smith, 1956:59) "First, nothing exists; second, if anything did exist we could never know it; third, if perchance a man should know it, it would remain a secret, he would be unable to describe it to his fellowmen."

Plato, as I noted above, believed that some were guided by reason; most people, though, were dominated by appetite. Hence, the masses were clearly less "rational" than the leadership. Much later, Edmund Burke's conservative principles included (Sabine, 1961:617) ". . .a belief in the relative impotence of individual will and reason to deflect [the social system] from its course. . . ." One characteristic of classical conservatism has long been a distrust of humans' rational capacity.

The foregoing puts my thesis in some historical context. As my argument unfolds, I come down on the side of the pessimists rather than on that of the optimists. I conclude that rather than arrogantly referring to ourselves as homo sapiens, we might more accurately call ourselves homo insipiens.

In the next section, I refer to cognitive psychology to examine the process by which people make decisions. In the third section of the paper, I outline the possible neurophysiological underpinnings of cognitive processes. Finally, I consider the implications for political decision making.

II. Information Processing and Decision-Making

I discuss two important, interrelated features in this section: processing incoming information and decision-making. How do humans process information? For many theorists, a key concept is the schema. John Anderson, inter alia, argues that humans think in terms of schemata (the plural form of schema) (1980: 128), ". . .large, complex units of knowledge that organize much of what we know about general categories of objects, classes of events, and types of people." A schema is an internal representation which organizes and guides information processing. Generally, incoming information (if it reaches a sufficient level of salience for the individual) is "assimilated" into existing schemata, i.e., the input is "fit" into such cognitive structures. If a particular datum is not consistent with an existing schema, three things may happen: (a) the appropriate schema will "accommodate" and change to fit with the new information; (b) the information will be disregarded, (c) a new schema will be constructed (e.g., see Axelrod, 1973).[5]

Schemata help to make sense out of a complex world, a world which produces a wide array of stimuli. Morton Hunt (1982) discusses how knowledge is "packaged" in the semantic memory network (one aspect of LTM, or long term memory).[6] One illustrative network appears in Figure 1 (See, e.g., Loftus and Loftus, 1976; Rumelhart, Lindsay, Norman, 1971). This network represents the category of "animal," with several subcategories

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Figure 1 here

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also depicted, e.g., fish, bird, mammal. The "node" (or"prototype") for each grouping stands as a sort of Platonic ideal type. As new information enters LTM (through a process which I outline below), it is tied in to appropriate nodes, adding additional detail. Hunt notes the utility of this (1982:173):

> Our method of making categories has a simple and obvious biological rationale: it is the mind's way of representing reality in the most cognitively economical form. In the real world. . . traits occur in 'correlational structures'; observable characteristics tend to go together in bunches. . . . We may not have innate ideas. . .but our minds filter and compile incoming data in such ways that we tend to form prototypes and categories without help or instruction.

Although different students of cognition offer distinct models by which information gets into LTM, a standard portrait of the process is outlined[17] in Figure 2 (See also Loftus and Loftus, 1976; Klatzky, 1980).

Figure 2 here

The first stage in information processing is attending to sensory input from the environment. The "buffers" represent very short term memory (VSTM), in which stimuli are very briefly retained and the individual selects what he or she wishes to notice and process further (not necessarily consciously). If a person does not attend to the input, it decays within seconds. This first stage represents a perceptual screen to filter out irrelevant or non-important stimuli. Thus, in the beginning, there is attention.

The second stage is short term memory (STM), where input is processed further. The key limitation in STM is that only about seven ("plus or minus two") chunks of information can be handled at a time (Miller, 1956).

Hunt states that (1982:104) ". . .short term memory means our awareness of whatever things that have been processed just deeply enough to be part of current mental activity. . . ." Earl Hunt (1976) refers to STM as "conscious thought" because of the active nature of processing which takes place there. Information decays in STM within twenty seconds or so without further processing (through such strategies as "rehearsal"). If the incoming information passes a certain threshold, it will be subject to "elaborative processes" (intermediate term memory or ITM, according to Hunt). This third stage normally must take place to transfer input into LTM. It includes (M. Hunt, 1982:106):

> the extraction of deeper meanings from worlds, sentences, images, and the like; classification of these meanings; and the linking of this new information to some part of the organized mass of long term memories. All this can take place with remarkable speed, It's what has happened when, in a matter of seconds, you have forgotten the words of a sentence but registered its content.

Thus, we have arrived at the fourth stage, storage in LTM. Here, input is fit into the memory network diagrammed in Figure 1 (or, if dissonant, accommodation may take place). Information, in this instance, becomes a part of some existing schema (or may be fit into several different schemata). LTM is important, because it provides a benchmark against which to judge new input and, if that input does not readily "fit," may lead to "dumping" of the incoming information (for a good treatment of this, see Norman and Bobrow, 1976), or assimilation of it. Richard Nisbett and Lee Ross contend that (1980:36, 41) ". . .objects and events in the phenomenal world are almost never approached as if they were sui generis configurations but rather are assimilated into preexisting structures in the mind of the perceiver. . ."[8]

Obviously, people do more than just process incoming information. Each day, individuals are faced with a myriad of problems and must make

a host of decisions. Decision-making and problem solving are also important foci for students of human cognition. One basic finding is that when people must make decisions, they may not proceed ideally.

A developing literature on actual decisional processes demonstrates how far from the model people may diverge in practice. This is significant, for, as Janis and Mann point out, the more criteria of rationality which are not/met (1977:11), ". . .the more likely the decision maker will undergo unanticipated setbacks and experience post-decisional regret." Among deviations are a series of "shortcuts" (or heuristics) which people seem to adopt easily in decision-making. These overlap and are not completely separable, as the reader will see (For especially good introductions, see Kahneman, Slovic, and Tversky, 1982: Nisbett and Ross, 1980).

Confirmation bias. Simply, Hunt defines this as the tendency for us to (1982:191) ". . .look for and remember those instances that bear out our beliefs, but not those that do not. . . ." For example, Peter Wason, upon analysis of results of his "four card problem," finds that (1981:356) ". . .a fair proportion ot subjects continuously fail to correct their initial responses even when all the relevant information is made available to them that they are wrong." He notes that people evade facts if these contradict existing beliefs.

Availability heuristic. Mort LaBrecque defines this as follows (1980: 34): ". . . .objects or events are judged as frequent or probable, or infrequent or improbable, depending upon the readiness with which they come to mind." That is, one makes decisions on the basis of whatever pops into mind first (See Nisbett and Ross, 1980:18-23; Tversky and Kahneman, 1973); the most easily accessible information or schema is used to make decisions. Nisbett and Ross (1980) illustrate; they note how easy it is

for one to name an array of famous people from one's home state. One's conclusion? "Wow! My state is blessed with more than its share of eminent persons!" The difficulty, of course, is that one is most likely to hear about those persons from his or her own state, i.e. those names are most "available" for recall from LTM. Another application (potentially devastating) is to survey research. George Bishop et al. (1982a, 1982b, 1982c) argue that when a question is asked, respondents' answers to it can shape their subsequent answers. Why? Because the first question and its answer are most readily accessible from memory through a sort of "recency effect." Subsequent decisions in answering questions are unduly affected thereby.

Vividness criterion. Nisbett and Eugene Borgida observe that people seem (1975:935) ". . .irrationally eager to induce base rates from target case information." People generalize on the basis of very small samples. This heuristic represents the hoary "fallacy of the dramatic illustration," in which a person extrapolates to a larger group on the basis of vivid impressions (see Nisbett and Ross, 1980: ch. 3). J. Evans and P. Pollard apply this to powerful decision-makers (1981:336):

> A bias toward vividness might well mean that a powerfully placed decision maker will act on the basis of unrepresentative, but highly vivid, personal experiences or anecdotes and ignore the 'dull' results of large, well designed statistical surveys. . .It is evident that such behavior is undesirable, in the sense that it is likely to produce inefficient decisions and costly errors.

Mistaken covariation. Anderson states that (1980:158) "Humans have a powerful ability to detect covariations among stimulus events and to build schemas to embody these correlations." However, statistical errors easily occur. Anderson refers to racial stereotyping. A few characteristics (sometimes erroneously) are associated with an entire class of individuals, leading to the development of a false prototype. Yet, it is upon this prototype that one makes evaluations of group members (this category can also be

viewed as a subcategory of the following heuristic).

Representativeness heuristic. Here, people make mistakes due to a faulty understanding of what is typical or representative. As Nisbett and Borgida put it (1975:935), ". . .we are obtusely unwilling to deduce from base rate information to target cases. . . ." This heuristic is, in a sense, the mirror image of the vividness criterion, which describes people's propensity to generalize on the basis of very small samples (including, not uncommonly, N=1). It is a telling commentary that both naive subjects and trained scientists fall prey to this heuristic. Amos Tversky and Daniel Kahneman illustrate with the "gambler's fallacy." The gambler often feels that, with respect to coin tossing (1971:106), ". . .the fairness of the coin entitles him to expect that any deviation in one direction will soon be cancelled by a corresponding deviation in the other." So, if one had tossed 49 heads in a row, one would think that the odds are heavily in one's favor that one will get a tail on the fiftieth toss (rather than the real 50-50 chance). Generally, this heuristic is used to solve such problems as (Tversky and Kahneman, 1974:1124): "What is the probability that object A belongs to class B? What is the probability that event A originates from process B? What is the probability that process B will generate event A?"

Attribution error. Humans often attribute other people's behavior to predispositions or attitudes and ignore situational factors. That is, people infer motives from overt behavior. LaBrecque summarizes one experiment (1980:39. See especially Nisbett and Ross, 1980:126-127):

> Subjects who read an essay endorsing or opposing either legalization of marijuana or Castro's leadership in Cuba inferred that the author believes what he had written even when they know that the substance of the essay had been dictated by a political science instructor or psychology experimenter. In spite of this overwhelming situational constraint on the author, the subjects still attributed the author's views to his own dispositions.

Overconfidence. While not an heuristic per se, overconfidence seems to characterize peoples' decision-making. Hence, the issue calls for some attention. Stuart Oskamp observes that clinical practitioners (e.g., psychologists) have much more faith in their conclusions about clients from case-study material than is warranted. Oskamp contends that (1982: 293) ". . .a psychologist's increasing feelings of confidence as he works through a case are not a sure sign of increasing accuracy of his conclusions." Other studies have also supported the argument that individuals are overconfident of their decisions - including those instances in which heuristics play a central role (e.g., see Fischoff, 1982; Slovic, Fischoff, and Lichtenstein, 1982; Nisbett and Ross, 1980). People, then, tend to have great faith in often dumb decisions - and are extremely resistant to conceding error.

The various heuristics are not, as I said above, completely separable one from another; there is considerable overlap. However, taken together these do indicate that there are very real problems with assuming that strictly "rational" decision-making will naturally occur (as defined by Janis' and Mann's criteria) (For a lively debate over implications for rationality, see Cohen, 1981). The availability heuristic casts doubt upon the criterion of a wide ranging canvass of options; the vividness criterion and representativeness heuristic are inconsistent with a cost-benefit statistical calculation; the confirmation bias works against taking account

of all appropriate information; and so on. Developing hypotheses to explain phenomena may fall prey to attribution error, mistaken covariation, confirmation bias, etc.

All of this having been said, I must point out that individuals' ordinary, day-to-day decisions based on these heuristics tend to come out well (see Nisbett and Ross, 1980:chapter 11). Even if they do not, though, the costs of bad decisions are normally not all that great. Since it is a lot more time consuming and difficult to apply non-biased methods to relatively minor decisions, it is understandable (and sensible!) that people use cognitive shortcuts. Of course, when one faces life-and-death issues, such shortcuts - if used - will be far more costly if the decision is bungled as a result. This point is the more poignant because decision makers may proceed with full confidence that they are behaving rationally when, in fact, their behavior reflects the operation of heuristics.[9]

Although one need not consider the psychobiological underpinnings of information processing and decision-making to get a handle on human cognition, abundant findings are available to outline such substrates. I believe that it is useful to examine these foundations, because such an exercise suggests the difficulty in achieving "rationality," since selective attention, information distortion, and heuristics may be very easy for humans to utilize and difficult to overcome as a result of facilitative neurophysiological mechanisms.

III. Psychobiology and Cognition

A. Introduction

Ulric Neisser, a cognitive psychologist, speaks generally of the psychobiological roots of schemata (Neisser, 1976:54):

> From the biological point of view, a schema is part of the nervous system. It is some active array of physiological structures and processes: not a center in the brain, but an entire system that includes receptors and afferents and feed-forward units and efferents. Within the brain itself there must be entities whose activities account for the modifiability and organization of the schema: assemblages of neurons, functional hierarchies, fluctuating electrical potentials, and other things still unguessed.

What of schemata? G. J. Dalenoort has suggested that schemata are underlain by cell assemblies. He notes that a central assumption is that (1982:180) "...cognitive concepts are stored, not in individual neurons, nor in fields (Gestalt psychology), but in clusters of neurons, which [Hebb] called cell assemblies." Representations are "stored" in dispersed cell assemblies in LTM (thus comporting with Karl Lashley's finding that memory must be understood as widespread and not localized. See Lashley, 1950). Models exist about how this might be done, although there is disagreement over the specific mechanisms involved (E.g., cf. John 1980; Pribram, 1971, 1980; Routtenberg, 1980; Willshaw, 1981).

B. Selective Attention, Schemata, and Screening of Input

A critical component of the first stage of information processing is attention to stimuli. If sensory input does not reach a certain threshold of salience or interest, it will not be further processed. In short, incoming data will be screened out (See Schubert, 1981 for an excellent discussion of this process). Kenneth Pope and Jerome Singer explore this issue and begin by quoting William James (1980:170): "'Thought is interested in some parts of these objects to the exclusion of others, continuously choosing from among them.'" This, in turn, is tied to a prior contention, that (Pope and Singer, 1980:170) "'Thought itself appears to deal with objects independent of itself.'" Prototypes are taken as the reality itself; thought and its referents are accepted as congruent, even though schemata are representational and abstractions (often distorted)

of the referent. Thus, prototypes or schemata tend to structure our perceptions and what we will attend to. Selective attention is, in part, a function of an individual's system of schemata.

The mind itself is constantly in operation, handling different types of information. As part of this (Pope and Singer, 1980:174), ". . .the salient and relevant information must be abstracted, put to use immediately when necessary, and kept alive and available in useful form in memory." Attentional processes serve as filters and exert a dual control (Pope and Singer, 1980:176) ". . .not only over what is appearing in consciousness at present but also over what consequently passes into short- and long-term memory." Thus, some input is screened out at the earliest stages of cognition--and this is not a random process.

Aleksandr Luria defines attention as (1973:256) ". . .directivity and selectivity of mental processes. . . ." By this, he refers to (1973:256) ". . .the factor responsible for picking out the essential elements for mental activity, or the process which keeps close watch on the precise and organized course of mental activity." Bryan Kolb and Ian Whishaw observe that people simply do not have the capability to process the plenitude of information in their environment. Because of this, there must be some screening in processing inputs. An important aspect of this is that (Kolb and Whishaw, 1980:265) "This selectivity is generally not conscious, for the nervous system automatically scans input and selectively perceives the environment."

Eugene Sokolov (1960) has suggested that one important feature of attentional processes is the formation of "neuronal models," representations in the brain of prior inputs. Subsequent input which matches a model (probably in the form of a cell assembly "stored" in LTM as noted above)

does not produce response; the individual is said to be habituated. However, novel input which does not comport with the neuronal model may produce an orienting reaction and attention would then be paid the new stimulus event. The orienting is highly selective. Thus, neuronal models may be important bases of selective attention (For promising application to imprinting, see Salzen, 1970; Salzen and Meyer, 1977).

The systems underlying attentional responses are discussed further by Diane McGuinness and Karl Pribram. The authors argue that existing studies indicate that three distinct systems undergird attention (1980:99):

> . . .the involuntary modes have been redesignated as arousal, a phasic [rapid habituation] short-lived and reflex response to input, and activation, a tonic [slower habituation] long-lasting and involuntary readiness to respond. A third system coordinates arousal and activation. The operation of this system results in voluntary control and is experienced as effort.

Arousal and activation effects are involuntary and can be termed reflex attention; effort represents voluntary attention and can be labeled as will.

Arousal is here defined in the same way that Sokolov did the orienting reflex (of course, a new neuronal model would form as habituation occurs). In short, arousal can be equated with Ivan Pavlov's "What is it?" question. Just so, activation is the "What's to be done?" aspect of attention. Activation involves the readiness to continue ongoing behavior (also termed "motivation" by Pribram [1981]). Effort is a conscious process by which individuals override habituations and resolve "conflict" between arousal and activation.

Arousal appears to be based on a system including the spinal cord, reticular formation, amygdala, and hypothalamus and is tied to emotion. McGuinness and Pribram say (1980:112):

> By way of its diffuse connections, this system is responsible for the ubiquitous arousal responses recorded throughout the brain concomitant with orienting. Forebrain control over this corebrain arousal system is exerted by reciprocal facilitatory and inhibitory circuits centered in the amygdala. These circuits control the onset and duration of neural arousal much as they control the onset and duration of visceroautonomic and appetitive responses.

Norepinephrine and serotonin seem to be the biochemical transmitters associated with the arousal system. Activation is the stage between arousal and action. "As the animal (or human) is intending to do something about the current situation his behavior is arrested" (McGuinness and Pribram, 1980:113). The forebrain structures of the basal ganglia (caudate nucleus, globus pallidus, and putamen) subserve activation. One set of functions is priming movement and preparing motor performance. McGuinness and Pribram (1980:115) contend that ". . .part of this system relates to an ability to transfer attention from one type of stimulus to another and maintain that attentional set." Basal ganglia lesions can affect humans' ability to maintain attention (E.g., Bowen, 1976). Dopamine is the neurochemical basis for activation. Finally, there is effort. This may be exerted to regulate and/or integrate arousal and activation. The hippocampus appears to play an important role in effort. McGuinness and Pribram state that (1980:119-120) ". . .experimental results suggest that interference with the hippocampal circuit reduces the organism to a state in which effort-demanding relationships between perception and action, between observing and instrumental responses, and between stimulus and response, are relinquished for more primitive relationships in which either input [i.e., arousal] or output [i.e., activation] captures an aspect of the behavior of the organism without the coordinating intervention of central control operations." ACTH-related peptides (including endorphins) seem to underlie effort.

McGuinness and Pribram contend further that arousal introduces emotion and activation motivation into the process of attention. They conclude that (1980:131) "Attention thus becomes the central process that links emotion and motivation to cognitive operations." Pribram (1981) argues that emotion comes about as a result of input discrepant with existing neuronal models. Key neurochemicals underlying activation, arousal, and effort tend to stabilize around a baseline "set point." Normal fluctuation around the set points for different systems (e.g., hunger, thirst, elation, depression, effort, comfort, etc.) defines the "state" of an animal.

Pribram asserts (1981:111-112):

> The momentary arousal produced by novelty (or its complement familiarity) appears related to endorphin homeostasis, the activation of motivational readiness is based on a dopaminergic system, and coordinating effort (or its inverse, comfort) is experienced as a result of the brain representation of the pituitary-adrenal hormonal stress mechanism.
>
> The model of emotional feelings that emerges from these data centers on a set of corebrain neurochemical states that comprise the experience of 'familiarity.' Familiarity implies equilibration, a feeling of reasonable amount of stability and smooth transition from one state to another. This set of stable states can be altered by novel or pain producing events and what is perceived as novel--or painful--is dependent on the configuration of the states that determine what is familiar. The distinction between novelty and pain is one of intensity only. . . . In contrast to the arousing disequilibration produced by the novelty-pain mechanisms, the maintenance of states is effected by tonic operations of the readiness system. . . When the demands of arousal are pitted against those of continuing readiness, the feelings of stress and effort are experienced. These experiences are allayed by a coordinating mechanism that adjudicates smooth transition from state to state within some comfortable band width of tolerance.

Pribram continues by distinguishing "affect" (emotions) from "effect" (motivation). Emotions are "stop" processes of reequilibration; motivation refers to "go" processes which carry forward an action. The basal ganglia underlie motivation; limbic structures undergird emotion.

What does all of this have to do with schemata and selective percep-

tion? Pribram argues that the difference between emotion and motivation is the difference between internal versus external control of neuronal activity. Internal control counteracts change in input configurations in order to stabilize ongoing neuronal activity (the baselines; the set of neuronal models already in place); external control enhances change and assures rapid equilibration with input discrepant with the existing configurations of neuronal models. The former corresponds with the Piagetian notion of assimilation; the latter with accommodation. Generally, there is a balance between the two processes. However, ethical operations tend to be "conservative." They (Pribram, 1981:121) ". . .often deal with input by deemphasis and elimination." Individuals turn inward when ethical considerations are involved and are more responsive to their own neural organization than to the environment. This may be most common when (Pribram, 1981:123) ". . .a person asks whether he is being true to himself." Ultimately, of course, discrepant information may still produce accommodation. But the results may be extreme. Pribram says (1981:122):

> . . .episodic processes. . .are internal stabilizing responses eradicating perturbation. The system is prepared to make itself independent of input. . .

As a result (Pribram, 1981:122):

> . . .the 'episode' may become chronic, for the incongruities arise again and again. Repetition (as in repetition compulsions) progressively lead to hyperstability of complete internal control; the organism becomes divorced from reality; the plan of action becomes inflexible. Thus, more and more, novel inputs become appraised as irrelevant, that is, infeasible to the ongoing plans. When this hyperstable, inflexible state is finally disrupted by an input that cannot be eliminated, the entire system becomes perturbed. And as the saying goes, "all hell breaks loose."

In short, Pribram provides as with a neurophysiological explanation of accommodation and assimilation. His argument--if correct--indicates that emotions are tied in with ethical processes. The end result of

the frontolimbic system's operation is that discrepant information tends to get filtered out.

C. Stages in Information Processing

After having been selectively filtered, sensory input is next processed in short-term memory (STM). The hippocampus may be intimately involved in STM. Talmage Peele notes that (1977:560) "Lesions of the hippocampus, as well as of other regions in the temporal lobe, have been reported to be associated with disturbance of memory, specifically disturbance of recent memory." Some argue that this structure is important in short-term memory processing (It seems clear that the hippocampus cannot be the storehouse for long-term memory, since extensive hippocampal damage does not affect greatly pre-existing memory), although there is still much debate (See, e.g., the target essays and commentaries in: O'Keefe and Nadel, 1979; Olton, Becker, and Handelmann, 1979). John Eccles has summarized one important view (1977:184): "The hippocampal system is merely the instrument responsible for the laying down of the memory trace or engram, which presumably is very largely located in the neocortex in appropriate areas."

James Young claims that the hippocampus is situated so that it could serve a key role in STM (However, see Kolb and Whishaw, 1980:328-329). He states (1978:93):

> A valuable clue is that the hippocampus receives projections from the ascending pathways of the medial forebrain bundle, which include pathways that signal reward. It also receives, via the cingulate and entorhinal regions of the cerebral cortex, signals from all the main exteroceptive senses, bringing information from the outside world. It is therefore very well placed for the job of giving to incoming signals the symbolic significance that makes them memorable.

Brenda Milner's famous study (1970) of "H.M." is consistent with this

speculation. Bilateral lesions of H.M.'s hippocampus (for relief of epilepsy) led to severe impairment in his ability to remember things for more than a few moments after they had occurred, i.e. he could not store memory in LTM. Young notes further that schemata are involved in the transfer from STM to LTM. He claims that (1978:94) ". . .storage depends greatly on meaning and our relating new information to. . .a schema or model" (See Norman and Bobrow, 1976).

There remains yet some gap between STM and LTM. Eccles (1977) asserts that it takes some thirty minutes to two hours to produce a change in neuronal into LTM. This is longer than the rather scant number of seconds that information synapses necessary for encoding that information can be held in STM. However, hippocampal circuits display an interesting characteristic which can fill this gap and maintain a memory while permanent synaptic changes are going on (this stage, as the reader might recall, has been termed Intermediate Term Memory). Studies of electrical activity indicate that after the initial activation of hippocampal neurons, prolonged "post-tetanic potentiation," a form of positive feedback or reverberation, may last for hours following fairly mild repetitive stimulation of hippocampal structures (See Eccles, 1977:178-186; Schmidt, 1978:113-115).

Finally, there is long-term memory. On the one hand, Wilder Penfield (1975) has reported that electrical stimulation of specific points in the temporal region leads patients to report recalling specific events or sensations which they had experienced previously. On the other hand, Lashley (1950) used ablation techniques to try to isolate the memory storage areas in rats. He trained rats to run mazes and then removed different cortical regions in various amounts. He could not discover any region whose removal extinguished the memory. Pribram (1971, 1980) has suggested a metaphor--the "hologram"--to synthesize these contradictory results. He

posits that each part of the brain contains sufficient information to reproduce the storehouse of recollections (See Willshaw, 1981 for a non holographic argument which comes to similar conclusions). The redundancy characteristic of the human brain may be such that each memory could be stored in several separate locations. Steven Rose has said (1976:260):

> This redundancy provides an answer to Lashley's puzzle. If the same memory is coded in many parts of the cortex; that is, if the state of threshold or synaptic efficacy of a large number of cells, not necessarily, indeed perhaps definitely not, all connected directly with one another, is altered during the learning process, then the memory may well be stored in many different parts of the system.

The specific mechanism seems to be alteration in neuronal synapses. Stimulation associated with learning can affect synapses' efficiency and the strength of their connections. A permanent change occurs which is related to storage of long-term memory (For reviews, see Rose, 1976; Rutledge, 1976; Schmidt, 1978). Eccles has said (1977:186):

> We have to imagine that in the brain there are immense numbers of patterns (engrams) encoded in the neuronal connectivities established by selective synaptic hypertrophies. . .When activated, these patterns of connectivity result in spatiotemporal patterns of impulses that are approximate copies of the patterns responsible for the original experience and are available for readout and hence for memory retrieval. Thus there are in the brain, and particularly in the cerebral cortex, these immense numbers of patterns of specific neuronal connectivities (engrams) ready for replay so that specific impulse patterns can arise that are approximate copies of those involved in the original experience.

The final word is not in yet. It seems safe to state, though, that many portions of the neocortex are part of long-term memory process, and there may be contributions by subcortical mechanisms as well.

Randal Sengel (1979) has linked memories with emotion in his delineation of a neurological basis for cooperative behavior (See also Kety, 1976; Young, 1978. For political applications, see Davies, 1976, 1982). His central hypothesis is that (1979:49) ". . .during human evolution, the

emotional states associated with defense, competition, and hunting could reinforce successful cooperative behavior through the influence of the limbic system and/or emotionality for social behavior.", The author notes that the limbic system links affect with memory and learning. Sengel asserts that (1979:50): "It is assumed that any perceptual experience which acquires an emotional connotation during memory storage will, upon recall and comparison, endow current experience with emotional and motivational significance." In like fashion, learning of ideas or concepts can, through limbic system connections, cloak these abstractions with affect. (For an argument which relies on hological theory and comes to similar conclusions, see G. Schubert, 1981). This argument is, of course, similar to Pribram's contention that there is a link between ethical processes, their schemata (or "models"), emotion, and arousal.

D. Plans and Heuristics

George Miller, Eugene Galanter, and Pribram (1960) argue that human cognition must be understood in terms of both Images (". . .knowledge of the world" [p. 1]; ". . .the accumulated, organized knowledge that the organism has about itself and the world" [p. 17]) and Plans (analogous to computer programs, these provide instructions so that decisions can be made or tasks carried out). Images are, essentially, schemata. The authors claim that (1960:2) "Unless you can use your Image to do something, you are like a man who collects maps but never makes a trip." That is, a Plan is needed to guide behavior. Images themselves are representations of knowledge or ideas. Without some kind of organizing program, Images will be inert. Among the Plans which humans possess, according to Miller et al., are "heuristics," those shortcuts in decision-making which I have already mentioned. Richard Davidson argues that these shortcuts probably

normally operate below the level of consciousness; he notes that (1980:18) "This unconscious system of information processing is presumably comprised of certain neural structures whose function is to transform input according to certain rules or algorithms."

Luria observes that (1973:79-80) "Man not only reacts passively to incoming information, but creates intentions, forms plans and programmes of his actions, inspects their performance, and regulates his behavior so that it conforms to these plans and programs; finally, he verifies his conscious activity, comparing the effects of his actions with the original intentions and correcting any mistakes he has made." An important part of this dynamic for Luria is actually selecting a general plan for performing some particular task. Among these plans are heuristics designed to develop solutions to problems or answers to questions. Clinical studies suggest that these heuristics are either located in or called upon by the prefrontal lobes (See also Miller et al., 1960). Luria notes that frontal lobe lesions produce (1973:339) ". . .the disintegration of intellectual activity as a whole. . . ." Such patients cannot solve verbal-logical problems; they are unable to program the intellectual act--to adopt a problem-solving strategy. They may not even see the problem which they are confronted with! Thus, use of heuristics is part of the larger process of the frontal lobes' formation of plans and programs to solve problems and make decisions (See also Luria, 1980).

The prefrontal areas have rich two-way connections with "lower" levels of the brain as well as with other cortical areas. Thus, these areas are in a peculiarly good position for synthesizing the complex system of afferent impulses from all over and organizing efferent impulses to regulate other structures. In fact, the prefrontal lobes seem to prepare

an individual for action and to verify that he or she has taken the proper course. One basic function of the prefrontal lobes appears to be (Luria, 1973:198) ". . .forming stable plans and intentions capable of controlling the subject's subsequent conscious behavior." This contention is reinforced by clinical findings which suggest that lesions of the frontal lobes produce a loss of patients' (Luria, 1973:210) ". . .ability to check. . .results [of actions carried out]." Patients with such lesions cannot form and execute solutions to complex problems (See also Luria, 1980; Teuber, 1964; Milner, 1964; Penfield, 1975).

Plans or heuristics, then, help to shape decision making. This is not all, though. Luria also claims that these programs organize perceptions of the sensory world. This, in turn, is facilitated by schemata (although Luria does not use that specific term). He describes the process in the following manner (1973:230):

> It begins with the analysis of the structure perceived, as received by the brain, into a large number of components or cues which are subsequently coded or synthesized and fitted into the corresponding mobile systems. This process of selection and synthesis of the corresponding features is active in character and takes place under the direct influence of the tasks which confront the subject. It takes place with the aid of ready-made codes (and in particular the codes of language), which serve to place the perceived feature into its proper system and to give a general or categorical character; finally, it always incorporates a process of comparison of the effect with the original hypothesis, or, in other words, a process of verification of the perceptual activity.
>
> During the perception of familiar objects, firmly established in past experience, this process is naturally contracted and takes place by a series of short cuts, whereas during the perception of new and unfamiliar or complex visual objects, the process of perception remains full and uncontracted.

This process, as with problem-solving, Luria says (1973:240), ". . .is dependent on the role of the frontal lobes in particular."

Are the various heuristics which I have mentioned before species-typical in character? Are these built-in "epigenetic rules" which guide

our thoughts (See Lumsden and Wilson, 1981)? At this point, there is no definitive answer. However, some of these heuristics are manifest across cultures and this at least implies that it is "easy" to utilize these.

E. Hypostatizing: A Case Study in Cognition

Davidson (1980:18) notes that, although our conscious access to use of heuristics or algorithms in cognition is limited, the outputs (i.e., decisions or problem-solving) do get fed into systems in the brain responsible for conscious representations. In other words, the products of nonconscious, sometimes nonrational information processing become accepted as valid during conscious thought processes. Pribram argues that one outcome of holographic thinking is that (1980:59): "The contents of consciousness (what we are aware of) are thus experienced apart from the brain apparatus (holographic and control) that organizes those contents from its input." Consequently, products of thinking come to be conceived as "outside" ourselves, as independent entities, as "in the nature of things." And, recall, these contents or products may be, as Davidson argues, outputs of nonrational, unconscious information processing rules. In the end, thoughts are accepted as reality, even though they may be distorted via usually nonaccessible cognitive processes. One case study of this is the development of hypostatized thinking - the process of attributing (Clark, 1976:6) ". . .a separate or higher reality to something, thus abstracting it from its relationship of dependence on other things."

My argument[10] begins from, roughly, Paul MacLean's "triune brain" perspective. MacLean (1973) has averred that there are three related components of the human brain which collectively influence our behavior--the "reptilian brain" (consisting of the forebrain basal ganglia structures and associated centers), the limbic system, and the neocortex. The first

of these is largely responsible for rigid species-typical behavior patterns (e.g., see Murphy, MacLean, and Hamilton, 1981); the second for emotional processes; the third for more intellective behavior.

The basal ganglia are likely to be critical centers in the process of hypostatizing. The operation of the neostriatum and pallidum could make it easy to accept abstract ideas and plans as guides to behavior, as the learning becomes "rigidified" through dopaminergic reinforcement.

The thalamus is a central "way-station" in the posited network of brain centers. It is deeply involved in "communication" between and among many of the structures mentioned in this section. It is also part of a system associated with learning and memory processes--and, obviously, learning is a key part of the operations by which individuals come to accept certain ideas-as-givens.

The limbic system and hypothalamus would seem to be critical in cloaking learned abstractions with affect (See also Pribram, 1981; Sengel, 1979). Furthermore, this linked set of nuclei is influential in learning and memory. Finally, the neocortex seems to be the repository of long-term memory, is important in learning, and is closely tied to the preceding laundry list of neural centers and, therefore, well situated to provide conscious override, the exercise of "will."

The motivational underpinning for this system may be endorphinergic and/or dopaminergic (or even something else, for that matter). These brain substances serve as mediators of mood. The endorphins especially seem potent as euphorigenics and analgesics. An opioid peptide rooted system could encourage people to think about certain things and along certain pathways (i.e., hypostatizing) because it would feel good to do so. Therefore, hypostatizations which people learn (rigidied and charged with affect)

may upon their exercise activate this "internal reward system" (IRS) (See Danielli, 1980) and reinforce, by the pleasure thus induced, their continued acceptance by the individual and behavior consistent with these. (For a similar argument, see Pettman, 1981).

Hypostatizing and the brain, then, may be wed. Social conditioning brought about through a concurrence of messages transmitted and reinforced through influential media of socialization (such as religion, the family, mass media, schooling, etc.) leads to individuals learning sets of values and beliefs. Mechanisms underlying learning and memory would "process" these values and beliefs and then "store" them in long-term memory. Coupling these values with the hypothesized IRS would provide a motivation for adherence to these values and behavior consistent with them. The euphoria associated with deeply held values would lend these considerable power (through the release of, e.g., opiates). Corticostriatal and corticolimbic connections, in turn, would "rigidify" these values, possibly through dopaminergic and/or endorphinergic reinforcement. Extensive reciprocal corticolimbic and pallidolimbic links through the thalamus would, if the model sketched herein be correct, provide the mechanism whereby values stored in "long-term" memory and rigidified by neostriatal processing would be cloaked in affect. The biochemical base for this, once more, could be dopaminergic and/or endorphinergic. Finally, corticostriatal, corticolimbic, and corticothalamic pathways allow, theoretically, for the "conscious" over-ride of hypostatized values and beliefs.

In short, the model proposed here can be diagrammed as in Figure 3.

Figure 3 about here

Social interactions and messages from the environment are processed by the

network of brain structures and motivated by the putative allied internal reward system. The result of this entire operation would be the propensity to hypostatize and then to behave in a manner consistent with this. Hypostatizations would probably be encoded as schemata (and as a form of "ethical neuronal model") and, hence, would operate to structure attentional processes, processing information, storage in and retrieval from LTM, and actual decision-making behavior. Would certain values be more likely to be hypostatized than others? This remains an important and open empirical question.

To this point, I have mentioned some elemental characteristics of information processing and decision-making and gone on to sketch their neurophysiological components. What, though, of the political relevance? That is the next subject to which I turn.

IV. Political Implications

A. Introduction

I have noted the following "threats" to the exercise of rational behavior by humans: (1) selective attention to information; (2) distortion of information stored in LTM by schemata (which themselves may be charged with affect and further distort information processes); (3) flawed decision making due to exercise of heuristics; (4) development of politico-ethical schemata ("hypostatizing") which may take on more fundamental "reality" than actual objects or information from the environment. Individuals will, of course, differ in the extent to which these various threats to rationality alter the course of their information processing and decision making. Too, many decisions reached by the use of heuristics will end up being successful.

Next, I consider briefly the implications for both mass and elites in terms of political information processes and political decision making.

B. Mass Political Behavior

Immediately, one would speculate that input of political information would be skewed. Doris Graber (1982), in fact, finds this to be so. Her intensive study of 21 persons clearly suggests the profound impact of pre-existing political schemata on attending to and storing information from newspapers in LTM. Evidence reveals that in certain subject areas (e.g., characteristics of politicians or problems of street crime) there is little accommodation of schemata to discrepant information, whereas in other cases there is accommodation. Bennett has also stated that (1981:116): "The importance of perceptual habituation in politics is undeniable. . . /S/uch forms of habituation may well account for the stereotypical perception of social problems." In short, there is evidence for rigidity of schemata in certain areas (salient social issues and political characterizations) and for accommodation in others.

Joseph Tanenhaus and Mary Ann Foley (1980) and Milton Lodge and John Wahlke (1980) use reaction time methodology and verify that people seem to think in terms of political prototypes or schemata. These two studies and Graber's lend empirical support to the posited existence of political schemata which affect political thinking (see also Peterson and Lawson, 1982).

Politics is a kind of puzzle for individuals, The political world abounds with problems--What should we do in El Salvador? How should we deal with the Middle East? What should be our stance toward the Soviet Union? Is recession worth it in order (maybe) to lick inflation? Will important policy proposals--whether domestic or foreign--work? Which candidate for

office will do the best job? Normally, such issues can pose difficult problems. Individuals' conclusions may be affected by many factors, among which are information level, ability to relate initial premises (based upon often ambiguous, inadequate, and distorted information) to conclusions, capability of evaluating the quality of information, and the relationship of means to ends. I have already noted Graber's study which suggests some degree of distortion in mass political information processing. Such distortion can flaw people's ability to draw appropriate inferences. Once a person begins to hypostatize political values and orientations, for example, his or her behavior is likely to be skewed accordingly.

What of the various heuristics? One would be surprised were the availability heuristic and vividness criterion not important, for example, in shaping voting behavior. In fact, some voting research already reported upon can be interpreted in terms of heuristics' operations. First, "availability." Samuel Kernell (1977) has argued that incumbents in the House of Representatives of the incumbent president's party suffer more in reelection bids because of voters' dissatisfaction with presidential policies than gain as a reward for satisfaction with a President's policies. Kernell notes some work in social psychology which suggests that people have a sort of general "negativity bias." Put in the language of heuristics, dissatisfaction would be more "available" from LTM and, hence, more likely to be called upon to shape voters' choices. Arthur Miller and Warren Miller (1977) find much the same phenomenon at work in the presidential election of 1976, with dissatisfaction with Gerald Ford's policies seemingly most salient (For a related consideration of "negativity," see Gant and Davis, 1982).

Second, the "vividness criterion" may well come into play. In their

study of the effects of television coverage upon the 1972 presidential election, Thomas Patterson and Robert McClure (1976) observe that network news depictions of the campaign emphasized hoopla and "happenings" rather than substance. In the process, viewers' political agendas seem to have reflected the "vivid," heavily played up election news rather than the important substantive issues of the day (e.g., Vietnam). In addition, short paid political advertisements seem to have rather successfully transmitted information about candidates' positions to voters; this information later was rather easily recalled. That is, slick TV ads rendered "vivid" candidates' issue positions, the latter of which were then encoded into LTM (ironically, it should be noted that voters got more issue information from TV ads than from network news! See also Patterson, 1980). Thus, vividness may shape that which is retained and, hence, "available" for retrieval and use in decision making.

Dwight Davis and Michael Gant explicitly comment on the importance of Kahneman and Tversky's "representativeness heuristic" as a likely shortcut which voters would use. The authors apply this to issue voting (1981:13):

> Referring back to the class of problems to which the representativeness heuristic applies, consider the problem: "What is the probability that candidate A is close to my conception of an ideal candidate B?" The ideal candidate, in spatial terms, is that candidate who lies at the ideal point, for the citizen, in the issue space. That is, the ideal candidate espouses the same issue positions as the individual on all relevant issues.

Subsequently, Davis and Gant test this expectation indirectly and their results are consistent with this speculation. The implications for voter "rationality?" Davis and Gant answer (1981:32):

> . . .voters may incorrectly classify a candidate on some dimension because the candidate reasonably approximates some stereotype associated with that dimension. Consider Jimmy Carter's "New Deal Image" and his "Republican" fiscal policies.

Pamela Conover (1980) examines the "attribution error" as one factor shaping voters' images of candidates, i.e. people infer motives and beliefs from candidates' behavior. She claims that a corollary is that when an individual does not have the information necessary to deduce candidates' beliefs, he or she will "create" the needed data from his or her own pre-existing beliefs. Conover utilizes survey data on citizens' evaluations of Richard Nixon's role in Watergate. The results lead her to conclude that (1980:107):

> . . .the empirical analysis of the determinants of attribution provides considerable support for the theoretical view of attribution outlined earlier. As predicted, behavior observation and perception of involvement are positively related to attribution. Also as predicted, target-based expectancies were negatively related to attribution, so that the more unexpected a behavior the greater the attribution. . . .

Thus, distortion of incumbents' and others' positions may occur as a result of attribution error.

Finally, Stanley Kelley and Thad Mirer (1974) have developed an explanation of voting behavior on the basis of an election-specific heuristic. In short, they claim that a simple decision rule seems to predict well vote choice in presidential elections. The individual adds up his or her likes toward each candidate and then substracts the sum of dislikes for each. Whoever has the advantage in the bottom line score gets the person's vote. If there is a "tie," the voter will use pre-existing party identification as the vote cue. One could argue that this "Rule" is an example of "availability" (likes and dislikes which are summed are likely to be selected because of ready accessibility from LTM).

Overall, it does seem clear that various bits and pieces of information from the literature point to the important role of heuristics in vote-related mass behavior. It certainly makes sense. There are significant

information and opportunity costs thrust upon citizens to exert the requisite effort to gather solid data based on the various candidates. Since there is a decision to be made (for whom to vote) under uncertainty (low information level), use of heuristics is a predictable, logical, and understandable--albeit flawed--strategy.

C. Elite Political Behavior

Any number of studies indicate that trained scientists can be susceptible to the same distortions in information processing as are the "untutored." It would be truly surprising were political elites exempt from exercising such shortcuts.[11] In fact, literature indicates, for example, the selective perception of policy-relevant information through the "confirmation bias." Some leaders tend to screen out disconfirming data much more readily than others. Shapiro and Bonham argue that elites' belief systems represent past experiences and current expectations (a conceptualization which would appear to be consistent with my use of "schema"). Gerald Hopple quotes their claim that (1980:101) "In the decision-making process, beliefs act like templates for channeling information and for relating possible policy options to perceptions about the intentions and behavior of other nations, and also to the policy objectives of the decision-maker." Hopple summarizes a good deal of literature in international politics which focuses on cognitive mapping, in which (1980:99) ". . .in order to simplify the complexities of the external world, the decision-maker mentally fashions a representation of the world which links possible solutions to a problem with potential consequences via a network or system of beliefs." He also says that one not infrequent outcome of that process is shaping or distorting information.

Confirmation bias is clearly at work in much elite decision making.

An operational code study of John Foster Dulles suggests that his belief system led him to interpret Soviet behavior as "evil" and British behavior as "good"--ignoring in the process the clear signs of British intent to join with France and Israel to attack Egypt in 1956. Why? Dulles' belief that Great Britain would not do anything to harm United States' policy (one attribute of a "good" state) acted to "screen out" very clear disconfirming data (Walker and Murphy, 1981-1982). That exercise of confirmation bias and its attendant dangers is not terribly exceptional is illustrated by the work of Robert Jervis (1976), Glenn Snyder and Paul Diesing (1977), and Irving Janis (1972).[12]

Another heuristic which has been utilized is "representativeness." Nisbett and Ross comment on President Lyndon Johnson's apparent use of the "Munich Conference script" in some of his foreign policy decision making. They summarize (1980:39):

> To the extent that politicians rely on such historic scripts, they may be unduly dogmatic and constrained and may be unresponsive to features that ought to distinguish a current political decision from an historical one. They may even be unduly responsive to prominent but superficial considerations of script representativeness, that is, the Munich script may be particularly likely to be evoked if the foreign leader requests the conference in his own country rather than on neutral grounds. . . .

Baruch Fischoff claims that (1982b:343) "It appears that when we receive outcome knowledge, we immediately make sense out of it by integrating it into what we already know about the subject." When interpreting history, this leads to reported outcomes seeming to be inevitable products of elemental forces or events. For the political leader, this understanding is then presumed to have <u>direct</u> relevance for decision making in the present. That is, the past is presumed to be "representative" of present circumstances. However, historical interpretations are notoriously overly "deterministic." It is doubtful that "hindsight bias" is <u>a priori</u> a good

basis for action. Historical explanations select out a few variables from the protean complexity of "reality." Such explanations--simplistic, then, to begin with--are extrapolated to present circumstances. Similarity of a few variables at present (which may or may not be the most critical) with a few from the past (whose certainty is unestablishable) is welded into a justification for some policy. This can be a dangerous game. Worse, overconfidence characterizes much historical analysis (again, see Fischhoff, 1982b). In sum, dependence on history as a model for decision making may produce poor policy. This is not to say, of course, that one should not look to history as <u>one</u> source of data for decisions. But one must be aware that strict reliance on history may yield tragedy or farce or--perhaps by good luck alone--effective policy. Snyder and Diesing note that (1977:313. See also Jervis, 1976):

> People use historical analogies to interpret current events, drawing especially on events experienced firsthand early in their careers that had important consequences for their own state, and also on apparently similar recent events. But these analogies tend to oversimplify the picture of neglecting differences between the present and past circumstances.

Crisis bargaining, the authors note, often is affected by misapplication of history (e.g., the Suez Crisis of 1956; the 1914 British-German Crisis). Furthermore, historical "scripts" or "schemata" are "vivid" to decision makers and, thus, would be more likely to be "available" when policies are being formulated (But, cf. Chan, 1979).

"Attribution error" may also be manifest. Snyder and Diesing state that (1977:293) "When states have identified each other as opponents, the familiar 'security dilemma' operates to produce exaggerated and sometimes illusory images of the other as aggressive or at least threatening and the self as defensive." Thus, the behavior of one's antagonist leads to

inferring that that behavior is designed to undercut one's own position; at the same time, self-attribution leads one to conclude that one's motives are quite plain and non-threatening to the other party. The exquisite dilemma of life is that, of course, one's attributions of evil to the other may be correct--but this is not always going to be the case (for examples of attribution error in crisis bargaining, see Snyder and Diesing, 1977:293-295, passim). The implications? Snyder and Diesing say (1977:301):

> In game-theoretic terms, the result may be to misperceive the game structure as Called Bluff when it is actually Prisoner's Dilemma: the opponent is seen as Chicken and a bluffer, and it is only oneself who is in Prisoner's Dilemma and cannot back down. If both sides hold this image (in reverse), the result could be disaster. In the genuine Chicken and Called Bluff cases, the error consists in underestimating the opponent's perceived cost of yielding while exaggerating one's own.

The preceding paragraphs at least suggest that elites are not immune to making decisions on the basis of heuristics. This may in turn lead to bad decisions with consequences for, literally, millions of people. One could hardly argue that the costs of heuristics being exercised in, for example, foreign policy making are necessarily minimal.

Briefly to summarize, we find that both mass and elite may utilize heuristics in decision making and may distort information during its processing. In the case of mass political behavior, the costs are likely to be less than when elites use these shortcuts and blunder thereby.[13] Given that "debiasing" has been found difficult to achieve (Fischoff, 1982a), this indicates that one should not assume a priori rationality in the political realm.

V. Summary

In this paper, I examine the implications of cognitive psychology and

psychobiology for the rationality of human political behavior. Basic findings in cognitive psychology point to distortions in the process of information processing and encoding of input into long term memory. Related to this, people seem to use shortcuts in problem solving or decision making (these shortcuts are termed heuristics). While in many simple day-to-day decisions these heuristics produce quite satisfactory decisions, they may also lead to mistakes.

Furthermore, the information processes and heuristics seem to be underlain by neurophysiological mechanisms which would render it "easy" to continue the use of these. Thus, there would appear to be a facilitatory set of structures which raise the odds of using nonrational decision making techniques.

What are the political implications? While nonrational procedures often work satisfactorily in low cost, everyday decisions, the costs may be much higher in many political decisions - especially when leaders are convinced that they are behaving rationally. Therefore, the potential damage of mistaken decisions as a result of use of heuristics and poor information processing is a critical issue. Perhaps our often expressed faith in rationality in human decision making is yet one more example of hubris. And the price of hubris can be very high indeed. In the Exodus from Sophocles' Antigone, Creon says: "Fate has brought all my pride to a thought of dust." The Chorägos closes this great tragedy by commenting on the folly of hubris:

> There is no happiness where there is no wisdom;
> No wisdom but in submission to the gods.
> Big words are always punished,
> And proud men in old age learn to be wise.

Figure 1: A Piece of the Semantic Memory Network
Source: Hunt (1982: 107)

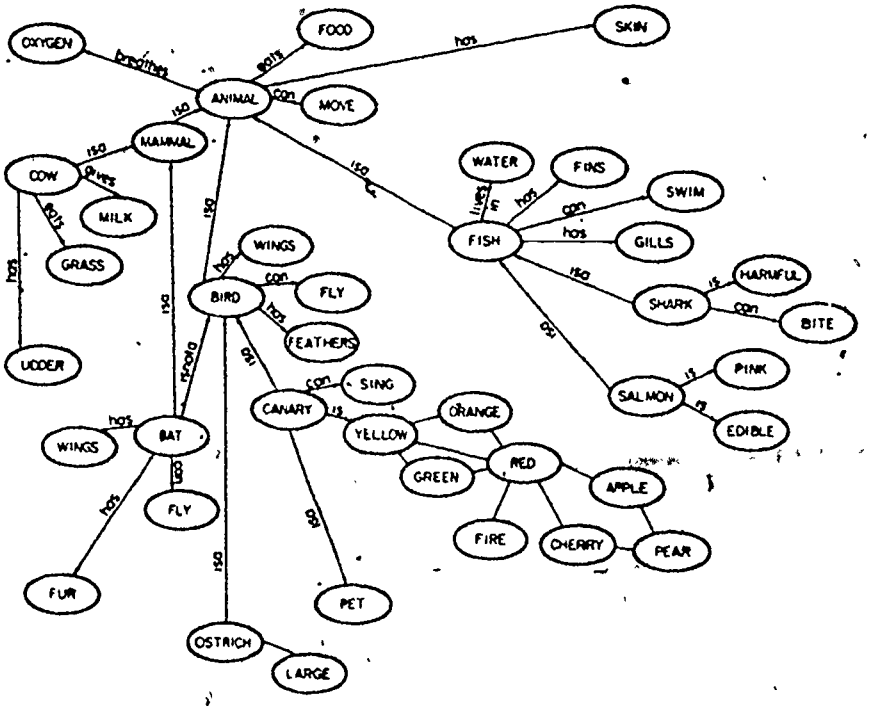


Figure 2: Flow Chart of the Human Memory System
Source: Hunt (1982: 103)

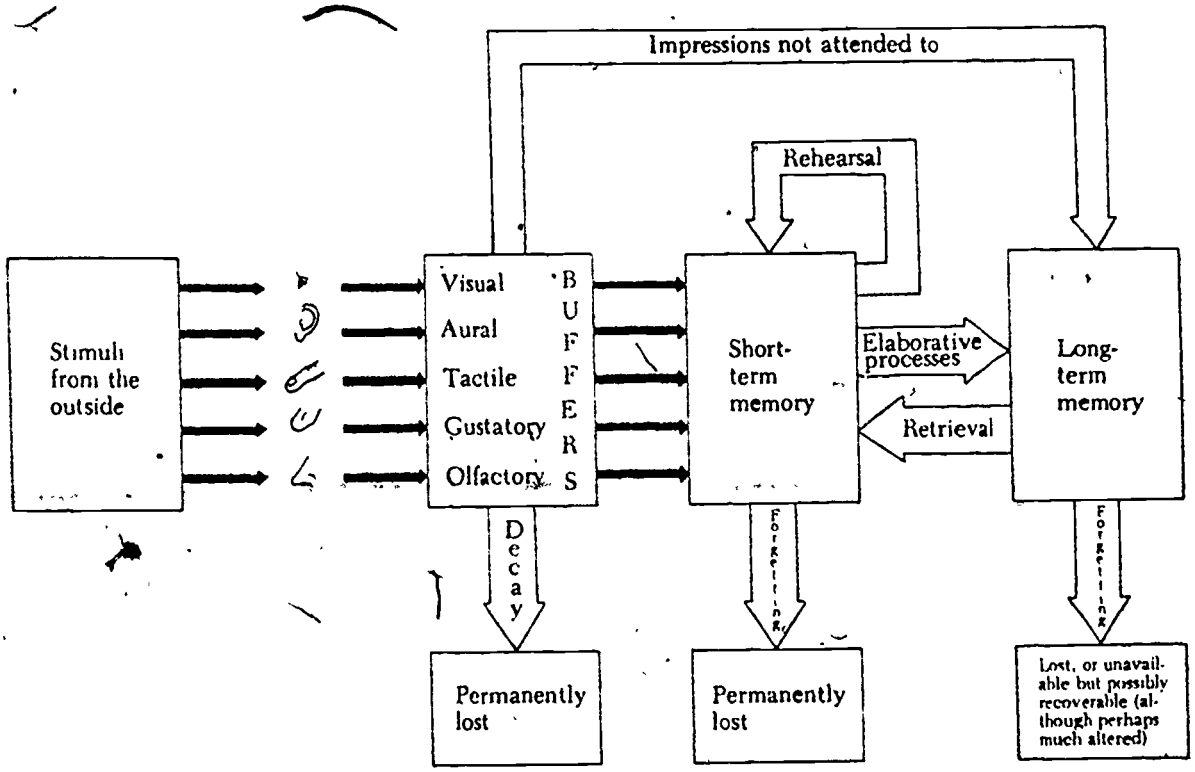
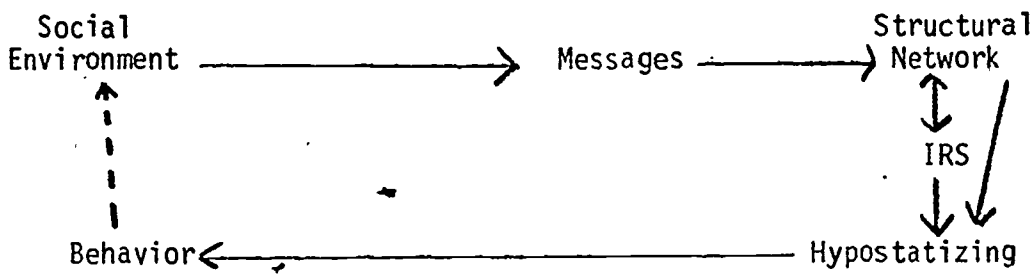


Figure 3. Model of Hypostatizing



FOOTNOTES

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[1]Of course, these various views of rationality are pretty formalistic. If Ludwig Wittgenstein is right, language shapes the very form of thought. The later Wittgenstein, in his Philosophical Investigations, rejected the idea that (Danford, 1978:85) ". . .the only way a proposition can have meaning is by its ability to 'picture' reality." The conceptualization of reason in this essay assumes that there are "right" and "wrong," "dumb" and "smart" decisions comporting with some knowable (at least sometimes) reality. Wittgenstein would argue that this very much over-simplifies the language process. My understanding of "reason" is quite similar to "the scientific method." Of Wittgenstein's view, Danford says (1978:121) ". . .so long as we conceive of the science of political phenomena on the model of modern natural science, with its particular emphasis on explanation by reduction, we are doomed to failure." For a very strong argument against "knowable reality" as a criterion of rationality, see G. Schubert, 1982.

[2]Much of this discussion is based upon Sabine, 1961.

[3]I am not referring to the "tradition" which John Gunnell (1979) attacks. I use the term, simply, to indicate that a number of thinkers over time have considered the issue of rationality and come to similar conclusions.

[4]This paragraph is based on Smith, 1956.

[5]Jean Piaget and his followers have dealt extensively with the phenomena of accommodation and assimilation. See, e.g., Piaget, 1970, 1971, 1972a, 1972b; Piaget and Inhelder, 1969.

[6]There is also a second type of memory which Loftus and Loftus refer to as "episodic" (1976:119), ". . .our record of personal life experiences. . . ." This representation is more susceptible to transformation and loss of information than semantic memory (See especially Tulving, 1972). Episodic memory does not include the capacity for inferential reasoning or generalization. There is substantial interaction between semantic and episodic memory, although the two may also operate independently. This second type of memory is necessary for a complete understanding of mnestic processes. Wittgenstein, for example, would argue that semantic memory is only a small part of a larger, much more complex picture (see Danford, 1978).

[7]Here, I rely mainly on Morton Hunt (1982), although his view is representative of many others' work. See, e.g., Craik and Levy, 1976; Shiffrin, 1976; Anderson, 1980; Loftus and Loftus, 1976.

[8]Memories themselves may be quite malleable, and postevent information--even if false--may become taken as part of the original event. This "mental-morphosis" (Loftus, 1981) can supplement or even alter the original memory. Thus, LTM is not quite as simple as depicted in the preceding passages.

[9]Glendon Schubert (1981) contends that overly lateralized males make irrational decisions on the basis of articifially rational procedures. This argument is not inconsistent with mine.

[10]For more detail, see Peterson, 1981, 1982.

[11]For a discussion of circumstances under which nonrational elements can come to play a role in elite decision-making, see, e.g., Verba, 1961; Snyder and Diesing, 1977: chapter 4.

[12]I intend to deal with this and other problems in policy making in more detail in Peterson (forthcoming).

[13]I expect to deal with the normative implications which I find in this analysis in yet another future essay.

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