



Four Motivational Components of Behavior

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I have been interested in what motivates people for over 35 years. During this period of time, our understanding of the processes involved has increased dramatically. From my reading of the literature, it appears that there are four major components that act, and more importantly, interact, to produce motivated behavior. Motivated behavior is a dynamic, ever-changing product of these components and their interactions. The idea that motivation is dynamic and interactive has been proposed before. In his force field theory, Lewin (1936) proposed a dynamic view of behavior, and Birch, Atkinson and Bongort (1974) also conceived of behavior as a constant behavioral stream changed from one moment to the next by the conditions of the situation in which one finds herself/himself. However, while Lewin's model emphasized internal and external factors, and Birch et al. proposed cognition as the major source of behavior change, the present proposal suggests that motivated behavior results from a complex interplay between at least four currently identifiable components. Those four components are: **biology, environment, cognition, and emotion**. Each contributes to the production of behavior in its own unique way and, each can interact with one or more of the others to produce motivated behavior. While it is reasonable to assume that developmental changes across the lifespan would also influence motivational processes, the writer will leave it to others to examine those processes.

Biology

The concept that biology can control behavior is not new. Early instinct psychologists such as James (1890) and McDougall (1970) proposed that many human behaviors were innate. Freud (1957) had a similar view. Ethologists such as Lorenz (1950) and Tinbergen (1951) showed that many animals displayed innate behaviors at appropriate times if the appropriate signal was present. Eibl-Eibesfeldt (1972, 1989) extended this research to include some human behaviors as well. Recently, Manoli, Foss, Vilella, Taylor, Hall, and Baker (2005, p.395) have shown that the gene (*fruitless*) that controls male courtship behavior in the fruitfly produces a set of proteins in a specific set of neurons in the fly's nervous system. Temporary inactivation of the *fruitless* gene in these neurons "abolishes courtship behavior" in males and when female fruitflies neuron's were induced to produce these proteins, the female fruitflies tried to mate with other females. Clearly, in some organisms some motivated behaviors are genetically encoded and controlled by the production of specific proteins within the appropriate neural systems. Further, Meyer-Lindenberg, Hariri, Munoz, Mervis, Mattay, Morris and Berman (2005) provide evidence that some human social motivation has a genetic component that is regulated via amygdala – orbitofrontal cortex connections in the brain. If the genes in question are missing, Williams-Beuren syndrome, characterized by hypersociability, is produced. Additionally, there appears to be a biological basis for feelings of trust in humans, that occurs as a result of the production of oxytocin (Kosfeld, Heinrichs, Zak, Fischbacher & Fehr, 2005).

Although the study of motivated behavior from the exclusive perspective of hardwired, biological commands is not as popular as it once was, what has become increasingly apparent is that biological processes, sometimes even at the level of genes, can **predispose** individuals to behave in particular ways. For example, Kagen's group (e.g. Kagen, Reznick, and Snidman,

1988) have provided evidence that extreme shyness depends, in part, on genetic differences in arousability. However, a low threshold of arousability is not enough to produce extreme shyness – some chronic environmental stress must also be present. Older siblings often provide this chronic stress and in their study, Kagen et al. found that two-thirds of the shy children were later born. A recent study published in the National Academy of Sciences (USA) by Fraga et al. (2005) makes the biological / environmental interaction crystal clear. Maps of gene activation and silencing in young identical twins are highly similar, however, these same maps for older identical twins diverge - showing that the environment (among other things) affects gene expression. So, even identical twins may behave differently because of different environmental influences that activate identical genes differently.

Environment

The above examples show how environmental variables can influence genetic predispositions, however, it is quite clear that environmental variables can have a large influence in their own right. Volumes of literature are available outlining the processes involved in behaviors learned via classical conditioning, instrumental conditioning, and observational learning (see e.g. Lieberman, 2004). In most circumstances these learned behaviors are not exhibited unless there is some incentive (motivation) for their production. Thus, motivation often seems to select various learned responses based on the previous motivational outcomes of those responses. External cues are also important in the decisions made about which learned behavior to select. For example, in my experience, the visual cues of a particular restaurant in which one has enjoyed a good meal are enough (via classical conditioning) to motivate me to stop there again. The reinforcement (instrumental conditioning) provided by an excellent meal

also produces incentive motivation for future stops. To push this example yet one more step, in the United States there is the belief that many vehicles parked in front of a restaurant means the food will be good. One may stop at such a place because we have observed the large number of cars parked there and try the restaurant as a result (i.e. as a result of observational learning).

The three types of learning just mentioned not only are capable of modulating our behavior as they occur (i.e. on the fly), but can produce individual motives in their own right. Many, if not most, human behaviors are learned. Early studies by Watson and Rayner (1920) and Pavlov (1960) showed that motivation could be generated by stimuli associated with negative outcomes. In Watson and Rayner's study a young boy was classically conditioned to fear furry, white objects as a result of their being paired with a loud sound. Pavlov (1960) demonstrated that motivational changes occur in dogs when they can no longer discriminate between two highly similar stimuli. Pavlov's findings are especially interesting because they suggest that one possible cause of maladaptive behaviors is the inability to discriminate between similar stimuli that have very different motivational consequences.

Studies in the 1960's by Garcia and Koelling and continuing through the present day, have shown that taste aversions can develop in as little as one trial and have long lasting motivational consequences (Garcia, Erving & Koelling, 1966; Garcia & Koelling, 1966). Tastes associated with subsequent nausea produce a strong aversion to that taste in the future. Bernstein (1991) has shown that the development of a taste aversion to a novel taste can be used to "protect" aversions from developing in cancer patients undergoing chemotherapy.

In operant conditioning, future responses are a function of the consequences of present responses. A reinforced response becomes more likely in the future, while a punished response becomes less likely. In many respects, the concepts of reinforcement and incentive motivation

appear to be describing the same phenomenon, but from slightly differing points of view. When discussing a behavior from the point of view of reinforcement we emphasize that the reinforcer changes the future probability of the response. That is, we are analyzing the situation from the point of view of the response. When analyzing behavior from the point of view of motivation, we speak of the behavior being motivated by some external event or goal (the incentive motivator). In essence we are describing the same set of events but using different terminology, depending upon whether we want to emphasize the change in the behavior (response) or emphasize why the behavior changes (incentive). In this regard, Mowrer (1960) has argued that learning changes what the organism “wants” to do, rather than what it “can” do. Such an analysis suggests that a crucial aspect of instrumental learning is the ability to modify the motivational processes concerned with a particular behavior, and, as a result, change the future probability of the response. In other words, learned motivational changes may be more fundamental than changes in response probability.

The discovery of “learned helplessness” in animals by Overmier and Seligman (1967), and Seligman and Maier (1967) showed that learned motivational changes produced by the ineffectiveness of behaviors produced dramatic changes in future situations where escape was possible. The dogs in these studies learned that nothing they did influenced the environment, so they stopped trying to escape, even in new situations where escape was easily possible.

Reinforcement/incentive processes are intimately involved with the production of many behaviors. While primary reinforcers such as food, water, sex, and avoidance of pain would seem to structure the behavior of many animal species, conditioned or secondary reinforcement appears to be a major mechanism for altering and motivating human behavior. There are numerous studies showing that motivational changes in human behavior can be produced by

using tokens or token economies. (see e.g. Petri & Govern, 2004, Chapter 6). One such study, by Fox, Hopkins and Anger (1987) showed that injuries resulting in lost time in two different strip mines were dramatically reduced through the use of a token economy system.

Certainly classical and instrumental learning contribute in important ways to basic motivational processes. Even sexual behavior in animals, often considered to be hardwired, is strongly influenced by these two learning processes. Pfaus, Kippin and Centeno (2001) summarize studies of sexual behavior influenced by learning. For example, stimuli preceding copulation produce sexual excitement in male rats and male quail; male rats prefer locations previously paired with a mate; male and female rats and monkeys will press a bar that allows access to a mate; classical conditioning elicits courtship behavior in a variety of animals ranging from fish to rodents to birds; earlier sexual experience increases the efficiency of sexual behavior; some species learn mate preference early in life; prior sexual experience has a disinhibitory effect on current sexual behavior; and in humans – we show classical conditioning of sexual arousal, and habituation to repeated erotic stimuli.

Studies of aggressive behaviors show a similar pattern. Classical and instrumental processes are intimately involved with the generation of aggressive behaviors (see Petri & Govern, 2004, Chapter 6). Clearly, learning processes play a large role in even the most basic of motives.

Vicarious reinforcement as a result of the observation of others is yet another way in which motivation is altered. When one observes another obtaining a valued goal as a result of particular behaviors, that person is often motivated to behave in a similar fashion. Similarly, observation of behaviors leading to an undesirable outcome, may persuade one to refrain from behaving in a particular way. A now classic set of experiments, performed by Bandura, Ross

and Ross (1961, 1963) showed how easily nursery school children would learn to model the behaviors they see – in this case – novel aggressive behaviors performed by adults.

In the preceding section on biology it was noted that the environment can interact with biological components to produce behaviors such as shyness. In reverse fashion, biology has also been shown to interact with environmental processes such as learning. Seligman and associates (Seligman, 1970; Seligman & Hager, 1972) for example, have shown that the associability of environmental components depends upon the preparedness of those associations. Some associations can be learned quite easily, others with some difficulty, and yet others perhaps not at all. Moreover, what can be learned will differ from one species to another because of different evolutionary pressures that have been exerted on those species. The research on preparedness clearly points out the interaction of biological processes with environmental conditions in the production of motivated behaviors.

Cognition

Biology and learning are processes that influence motivation. However, in the last 40 years or so, researchers have begun to examine the role of cognition in motivation as well. Most of this research has centered around human behavior, but some animal researchers have pursued the idea in animal studies as well (see e.g. Griffin, 1984,1992,2001; Heyes & Huber, 2000, Pearce, 1997; Shettleworth, 1998, 2001; Vauclair, 1996). The idea that how we interpret the available information around us influences our motivation has been studied in a number of different ways. One approach has been to examine how one's expectancies influence future behavior. This approach has proven useful in helping researchers make progress in understanding complex human behaviors such as achievement motivation. One's expectation of future success should depend, in part, on expectancies developed as a result of past successes,

and failures. Atkinson's achievement motivation model (see e.g. Atkinson & Birch, 1978) emphasizes the role of past successes and failures, present expectations about success in a particular situation, and the value of the goals we are trying to achieve in determining whether we will attempt a particular task. In addition, expectancy-value approaches have been used to explain motivation in the workplace as well (see Froman, 1986 for an overview of some of these approaches).

Another cognitive approach that has proven useful in understanding motivation is attribution theory. In some ways, attribution approaches to motivation are the flip side of expectancy approaches. When expectancies are used, we analyze past performance to predict future behavior. When attributions are used, we analyze our own or others' present behaviors and ascribe reasons for those behaviors. The interpretation we make when attributing events, then influences our future behavior. Furthermore, there appear to be "rules" that one follows when making attributions. We tend to attribute behaviors to existing predispositions (especially in others) or to the situation (especially for ourselves). Even though dispositional attributions are often incorrect (called the fundamental attributional error) does not change the fact that humans are inclined to make such attributions and to act on those attributions in the future Weiner and colleagues have shown how attributions also contribute to changes in achievement motivation (Frieze, 1976; Weiner, 1972, 1974; Weiner, Frieze, Kukla, Reed, Rest, & Rosenbaum, 1972 ; Weiner & Kukla, 1970; Weiner, Russell, & Lerman, 1978).

Do expectancies and attributions interact with biology and learning? It seems likely that they do, however, little is known about the specifics of how they interact. For example, why are we more likely to assume that someone else's behavior is dispositional? Perhaps because it has been adaptive to assume that another's behavior, once it has occurred, is likely to occur in a

similar way again. Making a dispositional attribution about another person might allow one to be better prepared to deal with that person in the future, expecting that they will behave in a way similar to the way they behaved in the past. The interpretative processes used to develop expectancies or to make attributions should have been subject to natural selection like any other trait. As a result, cognitive processes ought to depend, at least in part, on biological mechanisms.

Although we may be predisposed to interpret information in particular ways, it is also true that learning plays a crucial role in our cognitions. We are not born with the expectation that a particular food will taste good, but we quickly learn (and remember) the ones that do. We are also likely to make attributions in a particular situation based on our memories of experiences that were learned earlier. Those experiences, may have resulted from pairings of events (classical conditioning), pleasant or unpleasant outcomes (instrumental conditioning) or the observation of others (observational learning). To summarize, it seems likely that the “rules” by which we both develop expectancies and make attributions are influenced by biology and learning.

Social Motivation Although one could easily consider social situations to be a separate motivational category, it seems convenient to include social motivational processes as a part of the larger domain of cognitive processes. From this point of view, social motivational mechanisms result from how one analyzes his or her surroundings. The presence of other people, and the situation itself, will influence those interpretations.

It has been known for many years that the presence of other people influences one’s behavior. The early conformity studies of Sherif (1947) and Asch (1952, 1965) made it clear that one’s motivation to conform is greatly influenced by others. Similarly, Milgram’s (1963, 1965, 1975) study of obedience showed that people are much more obedient than they want to believe.

The presence of other people, either as peers (conformity studies) or as authority figures (obedience studies) clearly influences our motivation. We are likely to conform (as least some of the time) as a result of peer pressure and we are very likely to obey the demands of an authority figure, even when we do not want to. Compliance studies, of which there are many (see Petri & Govern, 2004, Chapter 10 for a more complete discussion), show that people often agree to direct requests from others, especially if those requests are prosocial (Dillard, Hunter & Burgoon, 1984; O’Keefe & Hale, 2001).

Zimbardo’s mock prison study (Haney, Banks & Zimbardo, 1976; Zimbardo, 1975) surprised many people because Stanford University students assigned the role of prisoner or guard quickly developed characteristics seen in real prisons. The students chosen to be prisoners quickly became apathetic, depressed, anxious, and half of them had to be “released” from the prison experiment early because of their deteriorating behavior. The students chosen to be guards quickly became abusive, insulting and threatening the prisoners, and in some cases verbally or physically assaulting them. The experiment, which had been designed to run for two weeks had to be halted after just six days. Since all the participants had been previously screened with a battery of psychological tests, and had been randomly assigned the role of either guard or prisoner, it seems clear that the behavioral changes were due to situational forces. The guards were all powerful while the prisoners were essentially helpless. The rapid changes in the behavior of the two groups must have been due to the situational factors of the experiment. The participants quickly learned their roles and behaved accordingly. As a result, it seems logical to assume that the cognitive interpretations made by the guards and prisoners in this experiment were based on what they learned about their environmental situations and their behavior changed to fit the conditions. Cognition and learning interacted to produce “guard” behavior and

“prisoner” behavior each with their own appropriate motivational and emotional sequelae. Such environmental factors may account, at least in part, for some inappropriate behaviors that occurred at Abu Ghraib.

There must, however, also be a biological component to social motivation. Many animals spend their entire lives as a part of larger groups (herds of wildebeests, schools of fish, prides of lions, flocks of birds, and so on.). Natural selection had to have exerted selection pressure on genetic traits conducive to survival in social situations. Dominance hierarchies, group danger signals, and so forth would have obvious survival value not only for individuals within a group but also for the group as a whole. Social animals therefore, must have evolved characteristics conducive to group living. Under most “real world” conditions conformity, obedience and compliance would have been adaptive. Additionally, the ability to rapidly learn about new social environments, and to adjust to those new situations must also have had survival value.

In some circumstances, cognition was probably not even a necessary component of social motivation. It has been known since the early 1900’s that the presence of others can have strong effects on an individual’s behavior (Zajonc, 1972). These social facilitation effects can be further divided into coaction effects and audience effects. Coaction effects have been found in chickens, dogs, armadillos, monkeys and humans (Petri & Govern, 2004, Chapter 10). For example, chickens raised in groups will eat 60% more than when raised individually. Apparently the competition for potentially limited resources motivates them to eat more. They will even eat more if exposed to a videotape of another chicken eating (Keeling & Hurnik, 1993). Similarly, monkeys will drink more orange juice when a mirror shows themselves drinking, and college students, like chickens, eat 60% more when eating in groups (Redd & deCastro, 1992).

Furthermore, this social facilitation is not limited to feeding situations; it has been shown to occur also in drinking, sexual behavior, running, the expression of emotion, and even shopping (Buck, Losow, Murphy, & Constanzo, 1992; Sommer, Wynes & Brinkley, 1992). Cockroaches, in whom cognition seems unlikely, also show coaction effects (Zajonc, Heingartner & Herman, 1969) when running away from light. Changes in behavior, as a result of the presence of others or the situation in which one finds himself/herself, appear to tap into very basic motivational processes.

Competence Cognitive motivation appears to influence behavior in yet another way. There is a large literature (see Petri & Govern, 2004, Chapter 12) on the specific human need to feel competent and to believe that one is able to control his or her environment. Rogers (1951; 1961), Maslow (1943; 1959; 1965; 1971; 1973a; 1973b; 1976), Rotter (1966; 1975), and Bandura (2001), as well as others, have written extensively on the human need for competence and control. We will examine only Bandura's model as an example. Bandura (2001, p.1) has called this unique motivation "human agency" and has defined it as the "capacity to exercise control over the nature and quality of one's life."

Bandura proposes that the best way to understand an event is to examine the interactions between the behavior, the environment, and personal factors such cognition, emotion and biological processes. He terms this interaction between elements reciprocal causation (Bandura, 1977, 1986, 2001). Each of these individual components influences the others. As a result, he proposes that it is better to consider an event in its entirety (i.e. holistically) than to break it down into the various component parts.

The present article is similar in concept: behavior results from interactions among biological processes, the environment/learning, cognitions, and emotion. Also similar to

Bandura, it seems undeniable that a behavior, once performed, will influence future behaviors. However, in a departure from Bandura's holistic approach, the present author believes that there is value in studying the individual contributions of each component, and perhaps more importantly, how each component interacts with the others. Psychology has made some progress in understanding the individual contributions, but little, to date, has been accomplished in understanding the interaction of components.

Emotion

For many years the study of emotion was considered too subjective for mainstream psychology. However, in the last 30 years or so there has been a renaissance in emotion research. Research on the universality of the facial expression of emotion by Ekman and others (see Ekman, 1972; 1999; Ekman & Oster, 1982 for overviews) provide a basis for a genetic contribution to the expression of emotion. Research on the neural circuitry of emotion (LeDoux, 1994, 1996, 2000) has provided strong evidence for the role of several cell groups within the amygdala in emotion. For example, LeDoux (2000) has provided evidence for circuitry that would allow sensory input to trigger emotion directly (without higher cortical processing). Such research suggests that semi-autonomous emotional circuits may play a crucial role in the motivation of behavior. The ability to act, as a result of emotion, almost automatically and with little or no higher cognitive processing, must have been adaptive earlier in our evolutionary history. It allowed quick behavioral responses in potentially dangerous situations with little or no thought required. It seems likely that such a system would still be useful today.

Cannon (1968) noted the close relationship between sympathetic nervous system arousal and emotion and proposed an emergency theory of emotion. Basically, he proposed that sensory information triggered emotion and sympathetic nervous system activity simultaneously. The

close relationship between sympathetic nervous arousal (the so called fight or flight system) and emotion suggests a strong role for emotion in survival.

Emotion, however, is not always automatic and noncognitive. Neural circuits have also been identified that allow cortically processed information to influence emotion (LeDoux, 2000). Furthermore, it has been argued that emotionally based behavior is often the result of cognitive appraisal (Lazarus, 1982, 1984). The appraisal of an emotionally charged situation must depend, at least in part, on our expectancies from past experiences and our attributions about the present one. Weiner's research group (see e.g. Weiner, Amirkhan, Folkes & Verette, 1987) examined the excuses that people make for failure and found that how controllable an event was determined one's emotion toward the individual making the excuse. If the event for which the excuse was being made was uncontrollable our attributions produce different emotions than if the event was controllable. Attributions, therefore, appear to influence our emotions and the emotions, in turn, influence our behavior.

When we make attributions and their accompanying emotions are produced, we are also learning (and storing) that information. Those memories (perhaps in the form of expectancies about behavior and the attached emotion) are then available in the future to motivate behavior.

Finally, it seems likely that while emotion can act directly and noncognitively on behavior in some situations, as noted earlier, the cognitive aspects of emotion more often serve to modulate behavior. If someone misses an important meeting and provides an excuse that creates negative emotion in you, your future behavior toward that individual will be tempered by the experience. You probably do not stop interacting with the person, but you do interact differently with them. So, while it is likely that emotion evolved originally as a mechanism for quickly producing behavior in dangerous situations, the cognitive side of emotion is more subtle,

allowing one to more finely tune responses to the environment. Such fine-tuning of emotion was probably necessary for humans in particular, because of our social nature.

Summary

This paper proposes that the motivation that energizes behavior is the result of a complex interaction among at least four factors: biology, environment, cognition, and emotion. Each factor makes independent contributions to the production of behavior, but in addition, each factor is capable of, and typically does, interact with the other factors to produce various combinations of behavior. Unless we study these interactions, our understanding of what motivates people to behave the way that they do will be incomplete.

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