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A Cybernetic Model of Self-Attention Processes

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An analysis of the experiential and behavioral consequences of self-directed attention is proposed, based on cybernetic or information-processing ideas. The proposed model includes the following assumptions: When attention is directed to environmental stimuli, those stimuli are analyzed and categorized according to the person's preexisting recognitory schemas. Self-directed attention often leads to a similar analysis of *self*-information; experientially, such a state of self-focus comprises an enhanced awareness of one's salient self-aspects. In some cases categorization—either of one's context or of some self-element—elicits a response schema, which constitutes a behavioral standard. If a prior categorization has evoked such a behavioral standard, subsequent self-attention engages an automatic sequence in which behavior is altered to conform more closely with the standard. This matching-to-standard is construed as the occurrence within a psychological system of a test-operate-test-exit unit or a negative feedback loop—a cybernetic construct applicable to many different phenomena both within and outside of psychology. More specifically, self-focus when a standard is salient is seen as the “test” or comparison phase of that feedback loop. If the matching-to-standard process is interrupted by one of several specified classes of events, subsequent behavior depends on an outcome expectancy judgment. A favorable outcome expectancy causes a return to the matching-to-standard attempt; an unfavorable expectancy results in behavioral withdrawal. Research support for the model is discussed, and comparisons are made with self-awareness theory, Bandura's theory of fear-based behavior, helplessness theory, and social comparison theory.

Psychological theorizing in this century has been characterized by the occasional emergence of quite general theories of behavior (such as psychoanalytic theory and learning theory), with intervening periods in which no general theory has seemed universally applicable and problem-specific theories instead have predominated. In recent years yet another general approach to understanding behavior has begun to coalesce, an approach

usually identified with the terms *information-processing*, *cybernetic*, or *control* theory (e.g., Apter, 1970; Buckley, 1968; Powers, 1973; Singh, 1966; Wiener, 1948). In the minds of many theorists and researchers, information-processing ideas provide an ideal framework within which to confront a wide variety of problems. Indeed, it is a framework that, by virtue of its abstractness, many believe may provide the best basis yet attainable for a

comprehensive model of behavior. This article represents an attempt to apply such ideas to an area of interest to social psychologists that has not been treated before in these terms. That area is the experiential and behavioral consequences of self-directed attention.

The article is divided into four major sections. The first section is intended to provide some background to the theory that is presented later. This background material includes a brief summary of Duval and Wicklund's (1972) theory of objective self-awareness and a basic introduction to the uses of the terms *cybernetic*, *control*, and *information processing*. In the second section a theoretical model is presented, along with some evidence in support of its propositions. This section represents the central portion of the article. Because of the unique relationship between this theory and Duval and Wicklund's (1972) self-awareness theory, a third section is included, which addresses specific points of conflict between the two models. The present theory also has some broader implications, however. These implications are considered in the final major section. That section includes comparisons between the present model and each of the following: Bandura's recent analysis of fear-based behavior (Bandura, 1977), learned helplessness theory (e.g., Abramson, Seligman, & Teasdale, 1978), and social comparison theory (Festinger, 1950, 1954).

### Background

#### *Self-Awareness Theory*

In 1972 Duval and Wicklund proposed a theory of self-awareness that consisted of two

central assumptions. First, they suggested that the objects of conscious attention could be dichotomized: Attention can be directed outward to the environment, or attention can be directed inward to the self (self-awareness).<sup>1</sup> Self-awareness is increased by stimuli that remind a person of himself or herself (e.g., a camera or a mirror); self-awareness is decreased by stimuli that distract attention from the self (e.g., perceptual-motor tasks, such as a pursuit rotor).

Duval and Wicklund's (1972) second assumption was that self-focus leads to a self-critical evaluation process such that the self-attentive person compares himself or herself with some standard on whatever behavioral dimension happens to be salient (see also Wicklund, 1975a).<sup>2</sup> Those authors further argued that self-directed attention is therefore usually aversive, because in most cases the person's actual behavior or state is worse

<sup>1</sup> Duval and Wicklund (1972) originally termed self-focus "objective" self-awareness and environment focus "subjective" self-awareness. In recent years this rather cumbersome convention has been widely abandoned in favor of such alternatives as high versus low self-awareness or self-focus versus environment focus.

<sup>2</sup> It will be noted that many *potential* standards of comparison exist at any given moment, even with respect to a single behavioral dimension. However, in Duval and Wicklund's theory it was assumed that at any given time the following two conditions obtain: One standard is more salient than others, and the person *adopts* that standard as his or her comparison value, at least temporarily. The same assumption will be made throughout the present discussion. Cases in which the individual's attention is drawn to a potential standard that is not adopted as a comparison value (because it is seen as irrelevant to one's behavior or for some other reason) are explicitly excluded from the analysis. This issue will be taken up in somewhat greater detail below.

Perhaps the distinction between standards and dimensions should also be clarified at this point. The distinction is similar to that commonly made between the terms *value* and *variable*. A behavioral dimension (or a variable) such as aggressiveness or politeness is defined by some quality that may be present in one's behavior to a greater or lesser degree. A standard is a point on that behavioral dimension, for example, nonaggressiveness or moderate aggressiveness. The existence of a behavioral standard, of course, always presupposes the existence of a behavioral dimension.

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than the standard of comparison. This aversiveness presumably leads the person to attempt to escape the self-aware state (Wicklund, 1975a, 1975b). If it is not possible to avoid self-awareness-inducing stimuli (and thus the aversive state), the self-focused person may attempt to alter his or her behavior so that it conforms more closely to the standard, as a way of reducing the aversiveness of self-awareness. That is, the aversiveness of self-attention was seen as the motivator for behavioral alterations. Thus self-awareness theory, as proposed by Duval and Wicklund (1972), was one of a larger class of drive theories—one in which the presence or absence of drive was determined by the direction of one's focus of attention.

This theory has been provocative, and it has led to a good deal of imaginative research. However, evidence has begun to accumulate that its assumptions are incorrect. The remainder of this article will be devoted to the assertion that the elements of self-awareness theory that have been supported by research findings can be most usefully construed as components of a more elaborate model of social cognition, and further, that such a model is most usefully framed in information-processing or cybernetic terms.

### *Information Processing, Cybernetics, and Control*

**Definitions.** Some amplification on the uses of the terms *information processing*, *cybernetic*, and *control* is in order at the outset. The term *information processing* is used in two related but distinguishable ways by psychologists. At a micro level, the term refers to analyses of the exact bases by which information is encoded in and retrieved from memory. At the macro level, *information processing* applies to descriptions of control systems and is more synonymous with the term *cybernetic*. Cybernetics is the science of control and communications systems (Apter, 1970; Singh, 1966; Wiener, 1948, 1954). The term *control*, as used here, refers to the sequencing that is implicit in a set of instructions, each of which awaits and depends on the execution of the

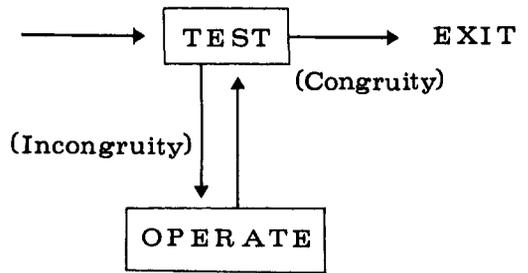


Figure 1. The TOTE unit, as presented and discussed by Miller, Galanter, and Pribram (1960).

previous instruction (as in a computer program).

A specific illustration may clarify the concept of control. Miller, Galanter, and Pribram (1960) introduced to psychologists a hypothetical construct called a TOTE unit (Figure 1); the word TOTE is an acronym for test-operate-test-exit. This construct is known more widely among cyberneticists and engineers as a negative feedback loop (negative because it reduces discrepancies between an existing state and a standard).

The diagram of a TOTE unit (Figure 1) portrays a self-regulatory system. The arrows in the diagram convey three things simultaneously. They represent energy, that is, the activation of a physical mechanism to do some sort of work; they represent information transfer, that is, the information that congruity between two values has or has not been attained; and they represent control, the fact that one process logically depends on an outcome of the previous process and then leads to a subsequent process. Any given process is said to control another when the execution of the first triggers the execution of the second. In effect, any decision-making flow chart describes a control sequence.

In general, the present use of the term *information processing* is meant to convey the latter (macro-level) meaning of the term. Though there are differences in implication between the terms *information-processing*, *cybernetic*, and *control* theory, the differences are relatively subtle, and the terms will be used interchangeably here.

**Applications.** Many people tend to think of the word *cybernetic* as applying solely to electronic computers. However, cybernetics as

a science was seen from its infancy as being applicable to both living and nonliving systems. To most cyberneticists, the living-nonliving dichotomy is not terribly useful (cf. Turing, 1950; Wiener, 1948). Because of the fact that the TOTE unit or feedback loop has some particularly important implications for the discussion to follow, let us consider the living-nonliving distinction as it applies to the TOTE unit (Figure 1).

In the control system of the TOTE unit, three mechanisms are activated in an orderly sequence. The first of these—*test*—is a mechanism by which a comparison is made between some input and a standard. If the input is not congruous with the standard, the second mechanism—*operate*—is activated. *Operate* alters the existing state of affairs in some way. Following *operate*, *test* recurs. If the input now is congruous with the standard, the final mechanism—*exit*—occurs, deactivating the system or freeing it for other applications. If, on the other hand, the second *test* reveals that incongruity still exists, *operate* is reactivated and continues to sequence alternately with *test* until congruity between input and standard is attained.<sup>3</sup>

The most commonly used illustration of the operation of a TOTE unit is the behavior of a nonliving system: the room thermostat. The thermostat senses existing temperature, compares that existing temperature with a preset standard, and activates a furnace when the temperature falls discriminably below the standard or activates an air conditioner when the temperature rises above the standard. However, this control structure is certainly not limited to electrical systems. Indeed, in the view of cyberneticists, the feedback loop may occur in virtually any type of physical system (cf. Buckley, 1968; Kuhn, 1974). The same control structure that is realized electrically in the thermostat is realized biologically in innumerable forms: for example, the homeostatic mechanisms that maintain normal body temperature, maintain appropriate levels of oxygen and nutrients in the blood and tissues, and regulate hormonal balances (cf. Wiener, 1948, especially p. 114). Moreover, the same control structure can be realized in psychological systems. For example, it is im-

plicit in a child's self-correcting attempts to reach out to touch a nearby object, and in the adult's checking and adjusting his or her clothing in a mirror.

Until recently, cybernetic constructs have not been widely applied to subjects of interest to social psychologists. The theorizing presented below is intended, in part, as a step in that direction.<sup>4</sup>

### The Model

The control-theory model of self-attention processes proposed here subsumes many findings generated by researchers in self-awareness theory. It does not, however, incorporate all of the same assumptions as does that theory. The difference in assumptions between the two allows the present model to accommodate existing data with greater internal consistency and to make predictions that seem not to be easily derivable from self-awareness theory as framed by Duval and Wicklund (1972). The model consists of the following propositions, which will be presented along with some amplification and supporting evidence. (Figures 2 and 3 provide a flow-chart illustration of the interrelationship among propositions.)

1. *A dichotomy may be imposed on the potential objects of conscious attention, such*

<sup>3</sup> This alternation may be quite rapid, of course, depending on the characteristics of the physical system in which it occurs. (Indeed, some theorists, e.g., Powers, 1973, hold that this information flow is better conceptualized as being continuous at all stages of the feedback loop.) Thus, although we can easily separate the component elements logically, for other purposes it is more convenient to think of the entire feedback loop as the unit of analysis.

<sup>4</sup> Control theorists seem to have been more aware of the potential applications of such constructs to social behavior than have social psychologists. For example, MacKay (1963) has noted that "an artifact capable of receiving and acting on information about the state of its own body can begin to parallel many of the modes of activity we associate with self-consciousness" (p. 227). An important exception to this general rule is the work of Powers (1973, 1978), whose background includes training in both psychology and physics. Even Powers's writing, however, has been concerned predominantly with psychological processes other than those involved in social behavior.

*that attention may be said to be directed either outward toward the environment or inward toward the self.*

This seemingly simple statement (which is identical to the first assumption made by Duval and Wicklund, 1972) requires several kinds of qualification and elaboration. First, it should be clear that the dichotomy between self-focus and environment focus is an imperfect one (as in some respects is the distinction between what is self and what is nonself). When one's attention is focused on the environment, one is attending to immediate perceptual input from the distance receptors: the eyes and ears. Self-focus, in comparison, includes a wider variety of possibilities. When attention is self-directed, it sometimes takes the form of focus on internal perceptual events, that is, information from those sensory receptors that react to changes in bodily activity (for example, the autonomic and proprioceptive activity that contributes to the subjective experience of emotion). Self-focus may also take the form of an enhanced awareness of one's present or past physical behavior, that is, a heightened cognizance of what one is doing or what one is like. Alternatively, self-attention can be an awareness of the more or less permanently encoded bits of information that comprise, for example, one's attitudes. It can even be an enhanced awareness of temporarily encoded bits of information that have been gleaned from previous focus on the environment; subjectively, this would be experienced as a recollection or impression of that previous event.

It is sometimes difficult to maintain the clarity of this dichotomy, as is illustrated by the following example. To look at a part of one's own body is, initially, to focus on the environment. The visual perception is a perception of a thing out in the world, until that percept is categorized as an aspect of self. Because the visual stimulus in question is a part of one's body, however, it is likely that it will ultimately be categorized as a component of self. At that point the experience may become one of self-attention, as one mentally considers that self-aspect. It is this mechanism by which experimental manipulations such as mirrors presumably act to heighten self-focus:

by inducing visual perceptions that remind subjects of themselves in a very general sense, that is, remind them of self-dimensions other than their visual representations.

It should also be clear that the term *heightened self-awareness* and its synonyms as they are used in this article do not necessarily connote a long, deep examination of the self. Rather, such terms imply an increase in the probability or the frequency with which attention is momentarily directed to some aspect of the self. In research, such increases in self-focus are caused by stimuli that remind subjects of themselves. It is assumed, however, that attention normally shifts back and forth between self and environment to some degree, whether such reminders are present or not.

2. *When attention is directed to the environment, incoming stimulus information is processed, leading to classification of that input.* The process of classifying incoming stimuli has been studied extensively by cognitive psychologists. Posner (1969; see also Posner & Rogers, 1978), Franks and Bransford (1971), Reitman and Bower (1973), and Neumann (1974) are among the theorists who have developed models to account for the classificatory process in various ways. Though these models vary in other respects, they have as a unifying idea the notion that, over a succession of perceptual experiences, a single representation in memory is abstracted from a series of relatively similar percepts. This single representation, then, stands for a class of perceptual events. These abstracted representations—sometimes termed *recognitory schemas* or *recognitory prototypes*—are stored in memory and are subsequently used to classify and interpret new inputs.

Evidence for the existence and use of recognitory prototypes in classifying stimuli in the environment comes from a vast accumulation of research in cognitive psychology. In cognitive research, the prototypes are typically generated experimentally by presenting subjects with a series of discrete training stimuli that vary along several dimensions. After training, subjects are found to classify new stimuli according to the organization implicit in the training series. Presumably the catego-

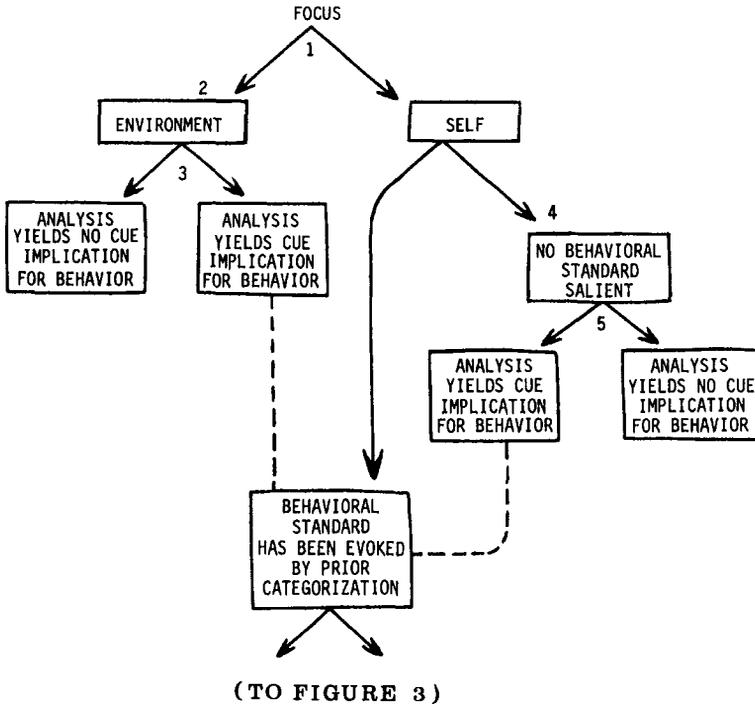


Figure 2. Flow-chart description of the cybernetic model of the consequences of self-directed attention. (Numbers in the figure refer to comparable propositions in the text.)

rizational structures that we carry with us in our day-to-day lives similarly reflect our experiential histories, but histories that are much longer and more complex.<sup>5</sup>

In the restricted settings of cognitive research, the subject categorizes only one stimulus at a time. However, in the broader context of social behavior one doubtless categorizes the nature of the interaction setting as a whole, as well as categorizing single stimuli. The kinds of information contributing to this overall identification undoubtedly include gestural, postural, and other nonverbal cues emitted by persons in the visual field; significant physical elements in the situation (e.g., presence of objects with identifiable uses); and verbally transmitted information, including inferences that the listener makes from the verbalization. Each cue that is encoded presumably contributes something to the resultant categorization of the context.

The work of a number of environmental psychologists (e.g., Barker, 1968; Frederickson, 1974; Gump, 1971) would seem to fit

very easily into this line of thought. Those researchers have emphasized that behavior settings vary along many discriminable dimensions, and they have worked toward the development of taxonomies of the situations in which behaviors take place. Presumably their efforts in categorization are similar to the processes that we all use continuously, albeit less consciously. In a similar vein, Cantor and Mischel (1977) have recently found evidence that personality-trait terms act very much as recognitory prototypes in the classification of other persons.

The classification of environmental inputs, which is assumed in the present model to

<sup>5</sup> The specific processes by which such schemas are formed and altered, although obviously very important, are outside the scope of this article. Thus, the experimental literature of that area is treated quite peripherally here. Inasmuch as this article is intended to deal primarily with consequences of self-directed attention, discussion will emphasize research with direct relevance to the propositions that deal with self-focus.

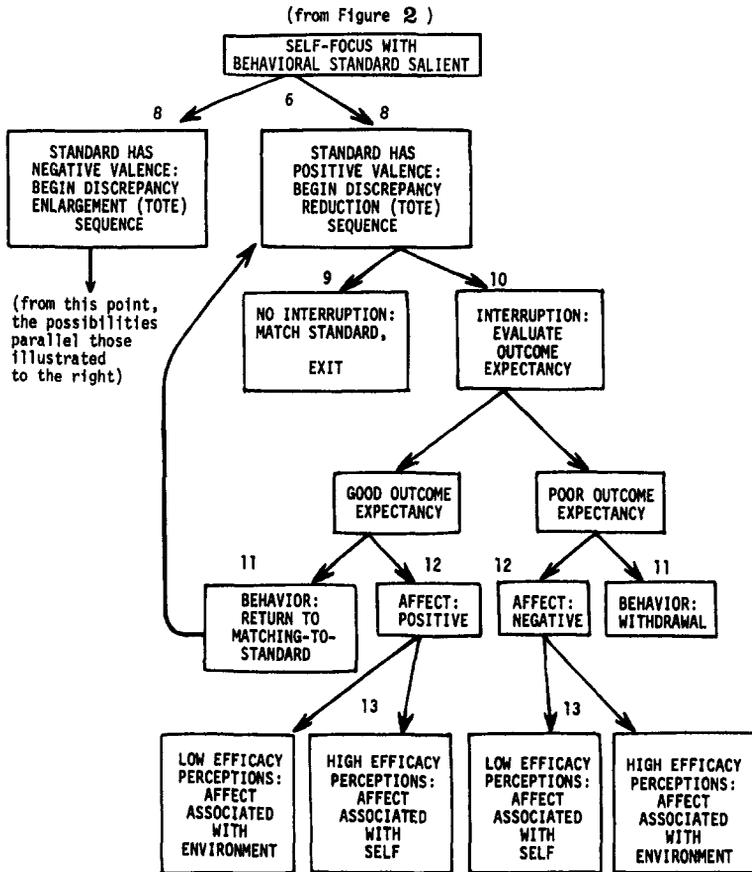


Figure 3. Flow-chart description of the cybernetic model of the consequences of self-directed attention. (Numbers in the figure refer to comparable propositions in the text.)

occur whenever attention is directed outward to the environment, is presumed to be an interactive process. That is, it involves a comparison of the incoming information with preexisting recognitory schemas.<sup>6</sup> Indeed, many believe that the resulting percept is as much a function of the previously encoded information as it is a function of the input information itself (cf. Neisser, 1976). The fact that this categorization involves such an interaction between input and schema suggests another qualification that must be made regarding the proposed dichotomy between self-focus and environment focus. Specifically, if processing and classification of even a very simple sensory input occurs by reference to preexisting recognitory prototypes, it would appear to be an oversimplification to say that attention is ever directed "at" the environ-

ment alone. The prototypes are, in a very basic sense, an aspect of oneself. The processing of environmental information thus seems to involve the simultaneous utilization of an aspect of the self.

At our level of analysis, however, the dichotomy still remains useful and meaningful. When internally stored schemas are accessed for comparison with environmental input during normal perception, this accessing occurs preattentively. It is the resulting percept that is represented in consciousness, not the evoking of the schemas. With regard to conscious experience, then, it seems quite reasonable for us simply to ignore the role played by the

<sup>6</sup> The perceptive reader may have noted that this activity in itself represents a TOTE unit at a lower level of analysis than is being emphasized in this paper.

schemas in generating the percept. Moreover, it bears repeating that the function of the sequence that leads to the percept is quite obviously the categorization of the stimulus input—and the input is an event whose point of initiation is outside the self. Because this is the goal of the activity, it thus seems reasonable to refer to it with such terms as *focus on the environment* and *processing of incoming information*. In both of these respects, the proposed dichotomy can be viewed as a verbal shorthand that is useful in classifying conscious experience at a macro level (where most of our present concerns are located) even while recognizing that at a micro level much more complicated events are occurring.

3. *In some cases, response-prototype information either constitutes part of a recognitory prototype or is directly implied by the recognitory prototype; in other cases, this information is not contained or implied* (see Figure 2). Saying that a recognitory schema used to identify one's behavioral context does specify response-prototype information is exactly equivalent to saying that the context evokes in the person a behavioral standard. As an example, most people in our culture have been taught to dampen the intensity of their behavior—that is, to speak and walk quietly—in places that are classified as religious in nature. When a person with this behavioral schema classifies a behavioral setting as being religious, quietness is immediately evoked as a behavioral standard.

Recognitory schemas do not always contain this kind of response-specifying information, however. In social psychological terms, many situations exist in which no particular standard of appropriate behavior is salient, where guidelines for action are not implicit in one's recognition of the nature of the context. Whether a situation has or has not evoked a response prototype as a behavioral standard has important implications for what occurs when attention is self-directed.

4. *If a behavioral standard has not already been evoked by classification of one's context, attention directed to the self leads to increased awareness of salient self-elements* (Figure 2). Stated another way, the analysis and categorization that were postulated above to occur

for environmental information when attention is directed outward (Proposition 2) occur with regard to self-information when attention is directed inward. The underlying components of this process presumably are the same as those discussed above. That is, comparisons are being made between information and recognitory schemas. The difference is that the information now being compared with the schemas is self-information—information from within (e.g., recollections of prior behaviors or present bodily feedback activity). Experimentally, in this type of circumstance, self-attentive persons simply become increasingly cognizant of themselves and their own salient characteristics, much as they might examine any external stimulus.

In such cases, self-focus is not evaluative except in the minimal sense that preattentive analysis "evaluates" in order to categorize. More specifically, this state of self-focus is not phenomenologically aversive.

The notion that self-directed attention may in some cases lead simply to heightened awareness of salient self-elements rather than to a self-critical examination is a major departure from the assumptions on which Duval and Wicklund (1972) based their theory. Yet there is a good deal of evidence to support this assertion. This evidence will be reviewed in the following paragraphs.

Duval and Wicklund (1973) themselves demonstrated that more self-attentive subjects make greater self-attributions for hypothetically experienced outcomes than do less self-attentive subjects. This outcome has since been replicated (Buss & Scheier, 1976), although other research suggests some limitations on the effect (Hull & Levy, 1979). It may be that the mere heightened salience of self as an entity led subjects in the Duval and Wicklund (1973) and Buss and Scheier (1976) studies to weight the self more heavily in the judgments they made. Alternatively, perhaps the salient aspect of self in this attribution-making context is one's potential as a causal agent (cf. Duval & Wicklund, 1973).

The reasoning that salient self-aspects may be more fully represented in consciousness when self-focus is high than when it is low has also been extended to the internal experi-

ence of emotional states (Scheier & Carver, 1977). In that research, it was proposed that when one's attention is self-focused in a context in which there is affect, one may attend to that affect as being the salient component of self. Thus, in two of Scheier and Carver's studies, subjects who had experienced positive and negative mood inductions subsequently reported feeling more elation and depression, respectively, when more self-attentive than when less so. In two additional studies, subjects reported experiencing greater attraction and repulsion toward pleasant and unpleasant slides, respectively, when self-attentive than when not. Others (Borkovec & O'Brien, 1977) have found similarly that directing a subject's attention to his or her bodily responses leads to an increase in the self-reported intensity of the emotion being experienced.

The notion that heightened self-focus leads to enhanced awareness of one's internal state suggests another interesting possibility: that self-focus can lead to heightened awareness of the *absence* of anticipated internal activity. This hypothesis was recently tested (Gibbons, Carver, Scheier, & Hormuth, 1979), in a study in which some subjects were led to expect arousal symptoms from a pill, whereas others were not. In all cases the pill was a placebo. Among subjects who expected arousal, fewer symptoms subsequently were reported by self-focused subjects than by those with less self-focus.

The Gibbons et al. (1979) finding appears to indicate that when led to expect a different internal state than is actually present, the self-attentive person has greater access to the veridical internal state than does the less self-attentive person. Two additional studies (Scheier, Carver, & Gibbons, in press-a) have investigated further this heightened awareness of internal experience among self-attentive persons by assessing whether it can serve to reduce other kinds of suggestibility phenomena. In the first of these studies, subjects were exposed to stimuli of moderate sexual attractiveness, which they were instructed to evaluate on the basis of their own bodily reactions. Subjects were led, however, to anticipate either highly arousing or very nonarousing stimuli. Subjects with experimentally height-

ened self-attention were less misled by these cues than were subjects in whom self-focus had not been increased. The second study extended the reasoning to the experience of taste. Subjects were led to expect either an increase or a decrease in a flavor intensity (relative to a previous sample); they then received either a slightly stronger or a slightly weaker solution. The intensity judgments subsequently made by highly self-attentive subjects were less in line with manipulated anticipations and more in line with actual flavor intensities than were judgments made by less self-attentive subjects. Thus, again, self-focus minimized suggestibility, apparently by increasing awareness of an actual internal experience.

Nor is the increased accuracy of self-report that occurs under high self-focus limited to reports of internal perceptual experiences. Other studies (Pryor, Gibbons, Wicklund, Fazio, & Hood, 1977; Scheier, Buss, & Buss, 1978) indicate that self-focus enhances people's accuracy in reporting on their habitual behavioral tendencies. Thus, for example, self-reports of sociability that were made under conditions of heightened self-attention were found to be highly correlated with unobtrusive measures of actual social behavior; reports made by less self-attentive subjects, on the other hand, poorly represented their actual behavior (Pryor et al., 1977). Presumably, self-attention provides more veridical or more thorough access to the memories that are relevant to such self-reports. Additional evidence that self-focus increases the activation of self-relevant memory areas has been provided by Geller and Shaver (1976).<sup>7</sup>

<sup>7</sup> In addition to determining ease of access to previously stored information, the direction of one's attention probably also has implications for the access one has to schemas for use in encoding new stimuli (whether they be self-stimuli or environmental stimuli). Thus, for example, when one is self-focused, one may not have good access to the schemas that are typically used for encoding information about the environment (cf. Vallacher, 1978). Indeed, easy access to a schema may increase its use, even in situations where such use would not otherwise be expected. This may be the mechanism behind the "top of the head" phenomena discussed by Taylor and Fiske (1978), in which some particularly salient

A final illustration of the fact that self-attention can lead simply to greater cognizance of the self comes from research conducted by Carver and Scheier (1978) as validation of self-awareness manipulations. Subjects in that research completed a self-focus sentence completion blank (Exner, 1973) developed and validated earlier as a measure of egocentrism. This instrument was completed either in an empty room or in the presence of a self-awareness-inducing stimulus. As was expected, proportionally more self-focus sentence completions were emitted in conditions of heightened self-awareness than under control conditions.

*Saliency.* One final issue, implicit in much of the above discussion, probably should be addressed at this point. What determines which aspect of the self is "salient" when attention is self-directed and which aspect of the environment is salient when attention is directed to the environment? A full and complete answer to this question cannot yet be given. Doubtlessly the ultimate answer will be complex. However, one determinant of saliency probably derives directly from the interactive nature of the categorization process described above. As was noted, classification of the environment takes place by comparison of input against recognitory prototypes. If the prototypes to which the environmental inputs correspond have cue implications for some specific self-information, the self-information is probably accessed (in a preliminary pre-attentive fashion) by the very process of classifying the environmental input. The aspect of self that is represented by that self-information presumably will be more salient than other self-aspects when attention is subsequently directed inward. Another way of saying this is that when we attend to the self, we are often examining an aspect of self that has been suggested by some cue in our environmental context. For example, an environmental stimulus that is categorized as *typically emotion-inducing* may cue a search for

stimulus exerts an inordinate influence on subjects' behavior. This notion might also have some relevance to the recent finding that imagining an event increases the degree to which a person expects the event to occur (Carroll, 1978).

bodily arousal as a salient self-dimension when attention is self-directed. Indeed, such a cue implication may serve in vivo as an impetus to shift focus from the environment to the self.

Similarly, the self-aspect that has just been under examination may be a major determinant of the aspect of the environment that is salient when attention is directed outward. For example, consider a case in which self-attention has had as its object an existing state of bodily arousal for which there is no recognized antecedent. In such a case, it seems likely that attention subsequently directed outward would be oriented specifically to searching for aspects of the environment that are categorizable as potentially arousing. Thus a self-aspect can have a cue implication for some aspect of the environment, leading to heightened saliency of that aspect when one's focus turns outward. More simply, when we attend to the environment, we are often focusing on aspects of the environment that have been suggested by some cue within ourselves.

5. *Just as categorization of environmental stimuli sometimes evokes a behavioral prototype as a standard, a categorization of a salient self-aspect may in some cases evoke a behavioral standard* (see Figure 2). As an example, a salient emotion might evoke a prototypic response to that emotion. The research presented above regarding awareness of affect was limited to reports of subjective emotional experiences. Other research has demonstrated, however, that heightened awareness of an affect may also lead to increased behavioral responsiveness to the affect. For example, Scheier (1976) found that provoked aggression was more intense among more self-focused than among less self-focused subjects.<sup>8</sup> Other research (Scheier, Carver,

<sup>8</sup> Scheier (1976) found that subjects' personal attitudes toward aggression did not correspond to the aggression they actually emitted. However, an attitude is only one type of standard that is potentially applicable in that context. The issue of varieties of standards will be addressed more fully below. The position taken here with regard to the Scheier (1976) data is that awareness of anger evoked a stereotypic retaliatory response prototype and that the prototype was used as a comparison value for subsequent behavior.

Schulz, Glass, & Katz, 1978) has demonstrated that feelings of sympathy are expressed to a greater degree among more self-attentive than among less self-attentive persons. Finally, yet other studies (Scheier, Carver, & Gibbons, in press-b) have shown that strong fear leads to greater avoidance among more self-attentive than among less self-attentive persons.

6. *A standard can have either a positive or a negative valence.* A positive valence implies that the standard is taken as a "desired" goal state. A negative valence exists when a standard of comparison is taken as an "undesired" goal state. Valences presumably are based on previous learning and generalization and on temporary encoding through imitation and verbal transmission. Multiple or component valences can easily exist with respect to any specific standard, of course. Consider, for example, the teacher's behavioral standard of going from the office to teach a class. On a given day the teacher may feel that he or she should go to the class because teaching is his or her vocation (positive valence); the teacher may also feel like not going because the teacher does not enjoy the class (negative valence). One important component valence, of course, occurs as a function of an obligation to do the behavior in question (cf. Vickers, 1973).

It seems likely that any given component valence can also vary in salience over time. Its salience is likely to depend on the salience of the environmental cues to which the valence is attached. For example, if bright, interested students have just been in the teacher's office, a positive valence may be salient. Presumably the accumulation of these component valences (weighted by salience) determines the overall valence of the standard as discussed here.

7. *Standards and behavioral dimensions can also vary in importance.* There are at least two ways in which importance may be construed in informational terms. The first depends on association of positive or negative events with the stimulus class during the person's prior experiences. A *priority label* may become part of the categorization as a function of the intensities of such events. High

intensity events (e.g., strong punishment for poor behavior with respect to a standard) would lead to a high priority tag or "importance"; low intensity events would lead to a tag of less priority.

A second possibility concerns the centrality or interrelatedness of a behavioral dimension with respect to other dimensions. Importance in this case would be defined according to the number of cross-reference tags attached to a given behavioral dimension that refer to other behavioral dimensions. For example, the amount of work that one person does may be weighed in his or her mind as important, but its importance does not extend to other areas of the person's life. The work, in effect, is left at the office. In contrast, another person may not only see his or her work output as important but may also view it as having implications for other parts of his or her life, for example, interpersonal relationships. The work output dimension thus would be effectively more important for the second person than for the first, by virtue of its interconnectedness with other dimensions.<sup>9</sup>

8. *If a behavioral standard has been evoked either by environmental input or by a salient self-element, subsequent self-focus leads to a comparison between self (one's present behavior or characteristics) and the previously evoked standard. Comparison between self and a positively valenced standard leads to discrepancy reduction; comparison between self and a negatively valenced standard leads to discrepancy enlargement* (see Figure 3). The comparison between self and standard is regarded as representing the test phase of a psychological TOTE unit. It thus leads to the engagement of one or the other of two possible adjustment and feedback sequences: either a negative feedback loop (discrepancy reduction) or a positive feedback loop (discrepancy enlargement).

The notion that heightened self-focus leads

<sup>9</sup> Standards can also vary in their degree of acceptedness, which is logically distinguishable from importance, even though the two in reality are often confounded. A standard that one accepts half-heartedly will be less reflected in behavior than one accepted enthusiastically.

to increased conformity of one's behavior to a salient standard was, of course, a main tenet of self-awareness theory, although for quite a different reason than is assumed here. Self-awareness theory held that discrepancy reduction was one of several potential responses to the postulated aversiveness of self-attention. The present model assumes that the discrepancy-reduction impulse is affect free and is the prepotent response to the recognition of a discrepancy. These distinctions are important ones and will be elaborated more fully in a later section of the paper.

*Discrepancy reduction.* Whatever its basis, the prediction that self-directed attention leads to heightened conformity to the salient behavioral standard has received ample research support. For example, a series of studies of instrumental aggression showed that subjects matched their behavior to salient standards (which varied from study to study) to a greater degree when made more self-aware than when less self-aware. In the first of these studies (Scheier, Fenigstein, & Buss, 1974), self-focus caused male subjects to conform to a "chivalry" norm when shocking a female victim who had not provoked them. In a second study (Carver, 1974), female subjects shocked at higher levels when self-focus was increased, in line with an experimentally induced standard in which high shock was portrayed as desirable. In yet other studies (Carver, 1975), subjects' aggressive behavior was more consistent with their previously verbalized attitudes when the subjects were more self-attentive than when less so.

Moreover, demonstrations of the fact that self-focus leads to increased conformity to standards are by no means limited to studies of aggression. For example, in an experiment in which speed of copying prose was made salient as a standard of comparison (Wicklund & Duval, 1971), more prose was copied within a given time span by subjects in whom self-focus was heightened than by those in whom it was not. In addition, compared to less self-aware controls, self-aware subjects have been found to behave more consistently with their previously assessed stage of moral reasoning (Froming, in press) and more con-

sistently with their previously assessed levels of sex guilt (Gibbons, 1978).

*Discrepancy enlargement.* The notion that standards can have negative valuation and that focus on those standards leads to discrepancy enlargement has received much less attention than has the matching-to-standard process. However, this notion is logically consistent with an older idea in social psychology. Newcomb (1958) wrote of the "negative reference group," a group with which one does not identify, but with which one actively compares oneself. Such a comparison allows one to emphasize, and indeed to further increase, the existing differences. Newcomb coined the term negative reference group in the context of social comparison theory (Festinger, 1950, 1954). Yet the nature of the process that Newcomb proposed is strikingly similar to the process proposed above for cases in which some negatively valenced behavioral standard is salient. The difference is that in the present model the comparison value need not be the attitudes or behavior of a particular group of people. It can be any negatively valenced value that is taken up for purposes of comparison. (The relationship between the present theorizing and social comparison theory will be examined in more detail in a later section of the article.)

Another class of behavior that can be viewed as discrepancy enlargement is a phenomenon that is usually analyzed in terms of psychological reactance (Brehm, 1966; Wicklund, 1974). Researchers have demonstrated repeatedly that coercive attempts to persuade lead to resistance to persuasion or even to attitude change in a direction opposite to the position being advocated (e.g., Brehm & Brehm, 1966; Snyder & Wicklund, 1976). Such effects may be interpreted as attempts to distance oneself from the standard of comparison (i.e., the position that is advocated in the communication). In the present model that standard would acquire a negative valence in very much the same manner as was postulated by Brehm (1966)—that is, by virtue of the threatening elements contained in the associated communication. Consistent with the reasoning that distancing-from-standard might occur under these circumstances

in response to self-focus, Carver (1977) has found that attitude reversal in response to a coercive communication was greater among self-focused subjects than among less self-focused subjects. Similar results have occurred in two additional studies (Carver & Scheier, in press).

*Standards.* Standards for self-comparison can vary widely, both in terms of their specific nature and in terms of their source. One reasonable distinction in this regard would be between the *type* of a standard and its *content*. For example, smoking in response to stress is different in content from eating, or pacing in response to stress. Yet they are all similar in one respect: They are of the type called *habit*. A personal-preference attitude is a different type of standard. A third type is an attitude based on more complex reasoning, for example, moral reasoning. Similarly, an instruction from another person that is adopted and conformed to is different in type from all these, as is the temporarily assumed socially desirable behavior that others nearby are exhibiting. With these multiple possibilities of source, type, and content, what determines which is evoked in a given situation and is thus taken as the comparison value when one is self-focused?

Specific applications of this general question abound in personality and social psychology. For example, the literature of moral development is replete with illustrations of the fact that moral reasoning is a judgmental *capability* rather than a typical way of behaving. Under which conditions will a person respond to a moral choice by exerting his or her psychological capabilities to their fullest, and under which conditions will the person's behavior be dictated by other considerations? The answer to this question is by no means clear, for the following reason. Although categorization processes and the use of categorizational schemas to classify and interpret information have recently begun to receive attention from social psychologists (e.g., Cantor & Mischel, 1977; Kuiper & Rogers, 1979; Markus, 1977; Rogers, Kuiper, & Kirker, 1977; Rogers, Rogers, & Kuiper, 1979), thus far virtually no work has been aimed explicitly at understanding the process of ex-

tracting behavioral prototypes in response to environmental cues. Which standard becomes salient in a given experimental situation has usually been more a matter of good intuitions on the part of the researcher who is preparing the situation than a matter of precise analysis of the determinants of salience. Quite obviously, this entire question is an important area for future work. For the present, let us simply note that matching-to-standard effects appear to have been demonstrated with regard to all of the following: habits<sup>10</sup> (Liebling, Seiler, & Shaver, 1974), personal-preference attitudes (Carver, 1975), moral reasoning capabilities (Froming, in press), and experimentally provided instructions (Carver, 1974).

9. *Matching-to-standard is the normal consequence of self-attention when a behavioral standard is salient, until and unless the process is impeded in some way.* (Although this and the following propositions will be framed in terms of matching-to-standard, it should be clear that the same logic is applicable to distancing-from-standard phenomena; see also Figure 3). Throughout a discrepancy-reduction sequence, self-focus represents a recurrence of the *test* mechanism of the psychological TOTE unit. *Test* will continue to alternate with one or more *operate* mechanisms until behavior or present state is brought into line with the standard. As in any TOTE se-

<sup>10</sup> The fact that matching-to-standard apparently can occur with regard to habits as standards raises the additional question of how "conscious" the process is in such cases. Matching to a habit standard may feel very unconscious, phenomenologically, for the following reason. The degree to which execution of a behavioral sequence seems conscious depends on the salience of its component acts and their consequences; this in turn depends on the degree to which those acts are monitored while being carried out. In habitual activity, the behavioral components have previously been encoded as a well-connected chain (cf. Schank & Abelson, 1977, discussion of cognitive "scripts"). To use TOTE terminology, a single *operate* consists of a behavioral sequence rather than a small bit of behavior change. Therefore, fewer tests are required over the course of the behavior than is the case for other, less well-known behavioral sequences. The relative paucity of attention devoted to monitoring this behavior suggests that it may be experienced less completely in consciousness.

quence, if successful completion of matching-to-standard occurs, it is followed by disengagement.

This proposition stands in direct contradiction to the assumption in recent statements of self-awareness theory (Wicklund, 1975a, 1975b) that the prepotent response to self-focus in a standard-salient context is avoidance of self-awareness rather than discrepancy reduction. As was noted above, this contradiction has important ramifications that will be considered further in a later section of the paper.

10. *If something impedes the matching-to-standard process, behavior is interrupted and an assessment process is evoked* (see Figure 3). This assessment entails the further processing of relevant information, yielding an outcome expectancy: an estimate of the likelihood of being able to more closely approximate the standard, based on the nature of the situation and on the behaviors available to the person. This assessment process can occur prior to the initiation of behavior if, for example, the person has foreknowledge that the behavior is going to be difficult to execute successfully. Alternatively, it can occur during the matching-to-standard sequence if the person encounters difficulty in either selecting or executing the appropriate operation to move toward the standard.

The assessment of outcome expectancy may be an evaluation of the likelihood of attaining the overall goal, given the context and one's resources. Alternatively, if the matching-to-standard sequence involves separable steps, it may be an assessment of the likelihood of attaining the next step. In either case, the assessment process has two products: One is behavioral, the other affective. These will be considered in turn.<sup>11</sup>

11(a). *If the assessment process leads to a favorable outcome expectancy, the behavioral response is a return to the matching-to-standard sequence* (Figure 3).

11(b). *If examination of the context and one's resources reveals a low subjective probability of being able to alter behavior appropriately, the behavioral consequence is withdrawal.* The latter would appear to represent a disengagement from the dimension in ques-

tion, a kind of going-out-of-the-field phenomenon (cf. Lewin, 1935). In practice, this could take the form of a mental dissociation from the dimension (refusal to consider further) or could occur as a behavioral withdrawal from contextual elements that either heighten self-attention or make the standard salient.

There are several types of events that can potentially prevent or disrupt the matching-to-standard process. One possibility is that the behavior in question is fixed in the past. If there is no opportunity available to repeat, reattempt, or undo the behavior, it is thus rendered unchangeable. In such a case, discrepancy reduction cannot even begin. An example of this state of affairs occurred in a study conducted by Duval, Wicklund, and Fine (1972). Some subjects in that study were informed that their scores on a previously administered test of intelligence and creativity were very discrepant from the levels that they had anticipated and desired. Moreover, it was implicit that the test was not going to be repeated, nor was any other opportunity to be provided for reducing the discrepancy (thus all subjects would have had low outcome expectancies with regard to matching the behavior to standard). In this study, subjects who were to wait for another experimenter after receiving the negative feedback withdrew sooner if the room contained a self-attention-heightening stimulus than if it did not.

Results of a more recent study (Steenbarger & Aderman, in press) confirm that this withdrawal tendency depended on the fact that the behavioral discrepancy was portrayed as unalterable. This study made use of a paradigm derived from that of Duval et al. (1972), but one in which there was ostensibly to be a second task. Steenbarger and Aderman (in press) found that when subjects experi-

<sup>11</sup> This proposition and the two following propositions, though derived independently, have a good deal in common with Stotland's (1969) analysis of *hope* as a psychological construct. Stotland used the term *hope* to refer to the perception of a high probability of attaining a goal and the term *anxiety* to refer to the perception of low probability of attaining a goal.

enced an inflexible discrepancy—that is, when the impression was created that subjects could not expect to alter their performances appreciably—self-awareness hastened withdrawal. When the impression had been created that improvement was a real possibility, on the other hand, no increase in withdrawal occurred as a function of self-attention.

*Intrapersonal deficit.* A second set of conditions that may lead to behavioral interruption stems from the possibility that the execution of the behavior in question requires specific skills, abilities, or characteristics that the person is not certain he or she possesses. The implication that these skills are required may cause the discrepancy-reduction attempt to be suspended and cue the assessment process. An example of the importance of this possibility is provided by recent studies of fear-based behavior conducted by Carver and Blaney (1977a, Experiment 3; 1977b). In those studies, some subjects were chosen explicitly on the basis of their doubts about their ability to cope with fear, whereas others were chosen as believing that they could cope with their fear. All of these subjects, however, reported having identical (moderate) degrees of fear. It seems reasonable that signs of fear while attempting to approach and pick up the feared stimulus (in this case, a snake) should cue a self-assessment process in all such subjects. In the Carver and Blaney (1977b) study, the subjects who doubted their abilities to overcome their fear (i.e., who had chronically low outcome expectancies) reacted to the perception of rising fear, induced via false heartbeat feedback, by avoiding attending to the behavior-goal comparison (according to self-reports) and by withdrawing behaviorally. The latter effect replicated a previous finding (Carver & Blaney, 1977a, Experiment 3). In contrast, those subjects who had expressed more confidence about being able to go through with the behavior (i.e., who had chronically higher outcome expectancies) responded to the perception of anxiety by focusing *more* on the behavior-goal comparison and attempting—successfully—to match the one with the other.

The Carver and Blaney (1977a, 1977b) studies investigated the behavioral conse-

quences of variations in expectancy, but those studies did not explicitly incorporate experimental manipulations of self-focus. More recently, however, a similar study has been conducted using a conventional self-awareness manipulation (Carver, Blaney, & Scheier, 1979). In that experiment, confident subjects were found to be undeterred by heightened self-awareness during the approach task, but doubtful subjects withdrew earlier in the approach sequence when self-focus was high than when it was lower. Postexperimental self-reports formed a pattern that was consistent with the present model, that is, that heightened self-attention had led to increased awareness of fear among *all* subjects and thus to self-assessment during the approach sequence; that self-assessment, in turn, had led to continued approach attempts among confident subjects and to early withdrawal among doubtful subjects.

This result has recently been conceptually replicated (Carver, Blaney, & Scheier, in press) in quite a different behavioral domain: i.e., responses to failure. All subjects in that research were confronted with a failure experience on an intellectual task, in order to create a large self-versus-standard discrepancy. Subjects then undertook a second task, ostensibly bearing on the same intellectual skill. Rather than assessing subjects' chronic expectancies, however, as had been the case in the Carver et al. (1979) study, an experimental manipulation of outcome expectancy was introduced. Subjects were led to believe either that they could potentially do quite well on the second task, or that they would probably do quite poorly. In reality, the second task was a measure of persistence. As predicted, subjects in whom unfavorable expectancies had been induced were less persistent when self-focus was high than when it was low. Also as predicted, subjects with favorable expectancies were more persistent when self-focus was high than when it was low.

The tasks in all of the above research provided subjects with escapable situations. That is, it was possible for subjects engaged in task attempts in those studies to withdraw physically from the behavioral context. This pos-

sibility does not always exist, however, when a perceived self-deficiency threatens one's behavioral adequacy. For example, consider the person with severe test anxiety who must take an unavoidable test. While in the testing situation, such persons probably are very susceptible to being interrupted from their performance attempts by stimuli that cue outcome assessment. In many test situations, this assessment yields unfavorable expectancy judgments. Because they cannot withdraw behaviorally, however, these persons may be frozen in the self-assessment phase of the sequence, where they repeatedly confront the evidence of their own inadequacy. Attempts at task-relevant activity are sporadic because outcome assessment indicates that such attempts will be unsuccessful, and the attempts are short-lived because the assessment process is likely to be re-evoked. Thus the test-anxious person is caught in a cognitive loop in which self-assessment and cognitive disengagement from the task predominate, rather than renewed effort.

This portrayal is consistent with Wine's (1971) characterization of the test-anxious person as being chronically self-focused in situations where the adaptive response is to be task focused. The present model seems more adequate than is Wine's, however, in two respects. Though Wine's analysis would not necessarily predict that self-focus can facilitate performance among persons low in test anxiety, the present model clearly does. Such performance facilitation has been demonstrated elsewhere (Wicklund & Duval, 1971). The present model also implies that self-focus can facilitate performance even among highly test-anxious persons, if circumstances lead those persons to have positive outcome expectancies. This possibility does not seem derivable from Wine's (1971) theory. Recent research (Slapion & Carver, Note 1) has yielded evidence that this can occur as well.

*Environmental constraints.* Yet a third set of conditions that would lead to behavioral interruption is the possibility that some feature of the environment may prevent the successful execution of the appropriate behavior (a circumstance that fits the usual opera-

tional definition of frustration). To use a somewhat trivial example, if one goes shopping at a time when stores are closed, one typically withdraws from the attempt. This withdrawal does not occur, however, until one's attempt has been interrupted and the realization has occurred that the desired outcome is unlikely (i.e., low outcome probability). The notion that environmental constraints lead either to withdrawal or to attempts to circumvent them seems a very obvious point. This case is discussed here largely in order to point out that the psychological processes implicit in this class of events are the same as those that occur in the other event classes discussed above. This indicates the high degree of generality of the processes under consideration.

*Novelty.* The analysis presented here of processes leading to withdrawal also bears some resemblance to Berlyne's (1963) discussion of the somewhat perplexing fact that novelty sometimes leads to approach, sometimes to withdrawal. He proposed that the presence of some degree of "collative" (i.e., comparison-requiring) properties in a stimulus (novelty, for example) engages exploration, movement toward the stimulus in order to assimilate it. Too much of the same properties, however, leads to withdrawal. According to Berlyne, the reason for this withdrawal is that the organism assesses the alterations required to assimilate the stimulus as being beyond its present capabilities. In effect, outcome expectancy with regard to assimilation is negative, and withdrawal is the consequence.

12(a). *The judgment that one cannot alter one's behavior in the direction appropriate to the standard may also lead to negative affect in proportion to the importance of the behavioral dimension or the standard and the perceived magnitude of the discrepancy.*<sup>12</sup> This negative affect remains present as long as the person focuses on the judgment that he

<sup>12</sup> It seems worth reemphasizing that importance here refers to importance as defined by oneself. A standard that others view as important but that seems irrelevant to oneself is for present purposes not an important standard.

or she cannot reduce the discrepancy. Evidence for this proposition comes from a study (Steenbarger & Aderman, in press) that was discussed above in connection with the assumption that self-focus leads to withdrawal only when discrepancy reduction is prevented in some way. That same study also showed that subjects who had been led to believe that they could not reduce the discrepancy experienced more negative affect when self-focus was high than when it was lower. This effect did not occur among subjects who expected to be able to reduce the discrepancy.

12(b). *Engagement of the assessment process can also lead to positive affect, if assessment leads to the perception of a favorable outcome probability.* This is comparable to Simonov's (1970) argument that emotion becomes positive when "there is a surplus of information available as compared with the information necessary to satisfy a sufficiently strong need" (p. 147). This is the elation experienced, for example, when one knows that one knows *how* to arrive at the solution of a problem, even though the problem has not yet been solved.<sup>13</sup>

The assumption of two potential responses (behavioral and affective) to the assessment of outcome expectancy raises a question as to their relationship. The two may be parallel responses. For example, both the cessation of behavioral attempts and the experience of negative affect may be cued by a recognition that nothing can be done to improve one's present state. This would be similar in some respects to Leventhal's (1970) parallel response model of reactions to fear communications. An alternative possibility is that behavioral withdrawal may occur as a response to the existence of negative affect. It is not possible to specify the relationship unequivocally at this time. It seems clear, however, that environmental constraints on potential behavior will have a large role in determining which of the two response modes predominates, particularly in cases of unfavorable outcome expectancy. That is, when the environment permits withdrawal, withdrawal should predominate. When the environment does not permit withdrawal, negative affect should predominate.

13. *Affect that results from assessment of outcome expectancy can take one of two forms, depending on the cognitions associated with the affect* (see Figure 3). What cognitions are linked to negative affect will be determined by the person's perception of the locus of the barrier to behavior alteration. If the person has a low *efficacy* expectancy—that is, if he or she perceives that behavior is being impeded by a self-deficit—the affect will be associated with the self. It may be reflected in such ways as reduced self-esteem. If the person has high efficacy expectancy and perceives that his or her behavior is impeded by some environmental constraint, the affect will be associated with those constraining elements. It may be reflected by such things as expressions of resentment.<sup>14</sup> Similarly, what cognitions are associated with positive affect will be determined by the perceived locus of the cause of favorable outcome expectancy. The affect will be associated with the self if personal efficacy is seen as having caused the good outcome to be likely; it will be associated with the environment if the positive outcome expectancy is ascribed to a benign environment. Although the logic behind this proposition is relatively straightforward, these predictions remain to be tested.

#### Comparisons With Self-Awareness Theory

At least three questions deserve further consideration with regard to differences between the present model and self-awareness theory as proposed by Duval and Wicklund (1972)

<sup>13</sup> This analysis may help to account for the observation that the anticipation of a pleasant event often seems more pleasurable than the event itself, as if knowing that the outcome will occur is better than its occurrence. Indeed, this would be consistent with the frequently expressed observation among psychologists that "the fun is over" once an idea has been conceived and a study to test it is designed.

<sup>14</sup> It may be this variable that distinguishes, for example, between depression attributed by a client to environmental contingencies and depression attributed to inadequacies of the self. That is, insufficiently positive outcome expectancies lead to depressed affect, but whether cognitions of self or environment are associated with the negative affect may vary with efficacy expectancies.

and amended by Wicklund (1975a). They are the following: (a) Under what conditions is self-attention aversive? (b) What instigates or energizes the matching-to-standard process? (c) Finally, what is the prepotent response to self-focus when a behavioral standard is salient—discrepancy reduction or withdrawal? These issues will be discussed in the following three sections.

### *Aversiveness of Self-Focus*

One important area of conflict between the present model and that of Duval and Wicklund concerns whether negative affect is an inevitable consequence of self-attention, and if not, what other conditions are necessary for it to occur. Duval and Wicklund (1972) and Wicklund (1975a, 1975b) have argued that any time a discrepancy exists such that one's present state or behavior is worse than the standard of comparison, self-attention is aversive.<sup>15</sup> "It is assumed that the objectively self-aware person will not simply react to himself impartially and in a neutral manner, but that he will come to evaluate himself as soon as the objective state occurs" (Duval & Wicklund, 1972, p. 3). "Certainly objective self-awareness is postulated to be an aversive, motivational state" (Wicklund, 1975b, p. 80). Indeed, as was stated at the beginning of the present article, the postulated aversiveness of self-attention was that theory's crux. In contrast, it has been proposed here that self-directed attention leads to negative affect only when the person perceives that he or she cannot alter his or her present state in the direction of the standard. (This discussion will be framed in terms of discrepancy reduction, but it is of course applicable to discrepancy enlargement as well.)

It is instructive to note that the studies cited as evidence of the unpleasantness of self-focus were invariably cases in which a within-subjects discrepancy existed *and in which subjects were prevented from altering their present state or behavior*. For example, in the first demonstration that subjects would attempt to escape from self-focus (Duval et al., 1972), the subject's behavior on the relevant dimension was anchored in the past and

thus could not be altered in the direction of the standard. Similarly, though self-esteem has been found to be reduced when subjects were made self-aware (Ickes, Wicklund, & Ferris, 1973), it is unclear to what degree that finding depended on the nature of the study's dependent measure. The dependent measure was a comparison between subjects' self-rated real selves and ideal selves along several dimensions. Subjects in that research had no way to *alter* their real selves. They were simply reminded of the real-ideal discrepancy to a greater degree when self-awareness was heightened than when it was not.

Aside from these examples in which subjects' behavior or characteristics were unchangeable, there appears to be no evidence that self-attention itself is phenomenologically aversive. To the contrary, Steenbarger and Aderman (in press) found an increase in negative affect only when self-focus was combined with a nonreducible discrepancy; when the discrepancy was flexible, the opposite tendency occurred. Similarly, Carver and Scheier (1978), in demonstrating that the presence of either a mirror or an audience increases self-focus, were unable to find any evidence that self-attention led to negative affect. A similar conclusion has also been reached by other researchers (Davis & Brock, 1975; Hull & Levy, 1979).

*Affect and valuation.* There is only one restricted sense in which the present model implies the existence of something resembling negative affect whenever self-attention is directed to a behavior-standard comparison. It may be useful in this regard to draw a distinction between the phenomenological experience of affect and the function of valuation (cf. Diggory, 1966, p. 70). The event that initiates the matching-to-standard sequence according to the present model is the fact that the *test* of the TOTE unit assesses

<sup>15</sup> Wicklund (1975a) has also pointed out that the existence of a positive discrepancy (i.e., self better than the standard) is a different case, leading in his view to positive affect. The present discussion, however, will be limited to instances of negative discrepancy, as has implicitly been the case throughout the article.

the existence of a discrepancy between a present state and an accepted goal state. Inasmuch as the function of the behavior change (*operate*) is to reduce the discrepancy, it is possible to construe the recognition of the discrepancy as being (on some level) a negatively evaluated event. However, there seems to be no reason to assume a concomitant phenomenological experience of negative emotion. As was noted in the preceding paragraphs, however, there is substantial reason to believe that negative affect occurs in cases when one is prevented from reducing those discrepancies (Duval et al., 1972; Steenbarger & Aderman, in press). Thus the data seem consistent with the assumption in the present model that self-focus has phenomenologically affective consequences only following outcome assessment.

To the degree that negative affect is experienced in contexts in which behavior change is (objectively) not difficult, it may be seen as a variation of the inability-to-alter experience. For example, a workman who repeatedly reaches to the wrong spot for tools may feel negative affect, not because of failure to reach the tool, but because the inability to correct the initial reaching impulse is beginning to alter his perceptions of self-efficacy with regard to tool handling. Similarly, a man at a formal dinner who suddenly realizes that he has been eating his salad with the wrong fork can easily alter his behavior. Any negative affect he experiences is caused by concern that his behavior may be regarded by others as uncultured and the possibility that he will not be able to alter the first impression that he has thus created. Finally, the perception of the need for a discrepancy reduction that will take an extraordinarily long time can lead to negative affect. However, this should occur only if there are salient doubts as to the ultimate outcome. If there is a positive outcome expectancy—*hope*, in Stotland's (1969) terms—positive affect should ensue, even if many months of behavior remain between the person and his or her goal.

#### *Instigation of Matching-to-Standard*

There is a second important distinction between the present model and Duval and

Wicklund's (1972) theory that is intimately bound to the question of whether self-focus is aversive. This second distinction concerns the question of how behavior change is instigated and energized when self-focus occurs and a behavioral standard is salient. As was mentioned above, Duval and Wicklund (1972) devised their model from a drive-theory perspective. By postulating that self-focus is aversive any time a within-self discrepancy exists, those authors could assume that subsequent behavior change was energized by a drive state and was instigated by that drive state's aversiveness.

In the present model, in contrast, the matching-to-standard sequence that is engaged when self-focus occurs in the presence of a salient behavioral standard is seen as the realization within a psychological system of a negative feedback loop. The fact that self-attention is required in order to engage the matching-to-standard sequence is interpreted in control-theory terms in the following way. Self-focus in a standard-salient context represents the *test* phase of the TOTE unit: an assessment of whether a discrepancy exists. The behavioral response to self-focus (the alteration of behavior in the direction of the standard) is the *operate* phase. The ordering of the control sequence of the feedback loop dictates that *operate* cannot take place before *test* reveals a discrepancy. Thus, focus on a discrepancy is required to engage the TOTE sequence. In phenomenological terms, this awareness simply corresponds to the realization that one is *in* a context in which there is a standard to match with one's behavior. A change in behavior depends on that realization.

Inasmuch as both models assume a comparison process between self and standard, the critical difference between them in this context seems to be the presence or absence of a drive postulate. This issue introduces considerable theoretical complexity, stemming from two facts: first, that a great many variants of drive as a construct have been proposed over the years, and second, that there is far from universal agreement on what measurable state, if any, corresponds to a theoretical state of heightened drive. A completely

adequate treatment of this complexity is well beyond the scope of the present article. The interested reader is referred to Appley's (1970) review article for a more detailed critique of drive and arousal constructs. Consideration of the issues here will be much more limited.

Does self-attention heighten drive, or does it not? One might at first view this as an empirical question, although it will be argued below that this appearance may be illusory. However, let us consider the existing evidence on the relationship between self-focus and drive. Although agreement on the nature of drive is often difficult to obtain, as was noted above, many researchers have assumed that drive is either equivalent to, or reflected by, autonomic arousal.<sup>16</sup> To the limited degree that evidence on this point is available, self-attention appears not to lead to an increase in physiological arousal. If one were willing to equate such arousal increases with heightened drive, it would thus appear that self-focus is not drive inducing. Evidence on this issue comes from two sources.

*Salience of nonarousal.* One set of data comes from a study (Gibbons et al., 1979) that was discussed earlier as evidence that self-attention when no standard is salient merely makes one more conscious of one's salient characteristics. Subjects in that study were led to anticipate that arousal symptoms would occur as a function of a pill (actually a placebo). Subjects later reported the extent of their symptoms, with self-attention heightened or not. If self-directed attention per se were arousal inducing, greater arousal should have been experienced, and thus reported, by subjects in the high self-awareness condition than by control subjects. Instead, the opposite occurred. Self-attentive subjects apparently became more conscious of the *absence* of arousal (consistent with the present informational analysis) and consequently reported fewer symptoms.

One difficulty with applying this finding to the drive question, however, is the fact that in the early statement of their theory, Duval and Wicklund (1972) largely ignored the possibility that a standard of comparison might not always be present. Wicklund (1975a)

later concluded that self-focus was aversive only if one's present state was worse than a salient standard of comparison. However, he argued at the same time that one was almost always worse than some standard and that one would ultimately become conscious of that discrepancy. Nevertheless, if self-attention should be drive inducing only when a discrepancy exists between self and standard, and if it were possible to assume a case within Duval and Wicklund's framework in which no standard is salient, then those authors might thus anticipate that self-focus would not increase drive in the Gibbons et al. (1979) case.

*Physiological data.* A second set of data on the arousal question does exist, however (Paulus, Annis, & Risner, 1978). Moreover, this finding is not liable to the caveat that was applied above to the Gibbons et al. finding. Paulus et al. gave subjects a task (copying prose) with a clear standard (copying quickly). As subjects prepared to attempt the task, either before a self-focusing stimulus or with no such stimulus present, the experimenter took a physiological measure called the palmar sweat index (Johnson & Dabbs, 1967). Increased palmar sweat values have commonly been believed to reflect increased arousal (cf. Geen & Gange, 1977; Martens, 1969a, 1969b). However, in the Paulus et al. study, *lower* values on this index were found among more self-aware than among less self-aware subjects. The meaning of the palmar sweat index is open to considerable question on other grounds (see the following paragraphs). But if that measure were acceptable as an index of drive, the finding of Paulus et al. would seem to contradict Duval and Wicklund's assumption that self-attention is drive increasing.<sup>17</sup>

<sup>16</sup> Though it certainly oversimplifies the case to imply that all theories utilizing a drive construct contain this assumption, it is probably fair to say that it is implicit in the large majority of drive models in social psychology.

<sup>17</sup> The data of Paulus et al. were derived in the context of a social facilitation paradigm. The present theoretical model has rather extensive implications for social facilitation phenomena, although consideration of those implications is beyond the scope of this article. These implications are, how-

It was noted above that the arousal or drive issue is not entirely an empirical one. There are also two important logical considerations that render the entire arousal controversy somewhat less meaningful.

*The meaning of physiological indices.* First, contemporary researchers in physiological psychology tend to recoil at the mere suggestion that autonomic arousal is a unitary phenomenon. Such psychologists are inclined to look at autonomic indicants in terms of what specific functions they imply rather than whether the organism is aroused. For example, Sokolov (1963) has proposed that one pattern of physiological responses comprises an "orienting" response, whereas another pattern comprises a "defensive" response. The orienting response is held to facilitate greater knowledge of an external stimulus by making the organism more receptive to input information from that stimulus. The defensive response, in contrast, involves an inhibition of sensitivity to input information (cf. also Hare & Blevings, 1975). This latter function presumably protects the organism from overstimulation.

This argument is easily taken one step farther, by assuming that such function-specific physiological response patterning is a normal concomitant of different kinds of *consciously controlled* behavioral involvement. Williams, Bittker, Buchsbaum, and Wynne (1975) have discussed this possibility in some detail (see also Lacey, 1967). They reasoned that experimental tasks vary in the types of attentional demands they make (as opposed to the degree of demand). Some tasks (e.g., a visual decoding task) require sensory intake; others (e.g., mental arithmetic) require sensory rejection. Conceptually, the sensory intake pattern seems similar to Sokolov's (1963) orienting response; the sensory rejection pattern, though not particularly "defensive," seems to embody many functional components of Sokolov's defensive reaction, in that there is a

suppression of sensory input. In the Williams et al. analysis, however, this pattern simply reflects the attempt to concentrate focus inward and prevent distraction. In a test of this reasoning, Williams et al. (1975) were able to show that subjects differed as predicted in cardiovascular response patterns as a function of the type of task being performed.

It is instructive to note, in this regard, that initial theorizing about the palmar sweat index (Dabbs, Johnson, & Leventhal, 1968) concerned attentional issues fully as much as it concerned arousal. Dabbs et al. (1968) argued that increased palmar sweat was associated with readiness to engage the environment, and that decreased values reflected self-directed attention and an attempt to concentrate. These descriptions seem a good deal like the sensory intake and sensory rejection patterns of Williams et al. (1975). Taken together, these two descriptions converge on two notions, one of them general and the other more specific. The general one is that at least some physiological indices may be more usefully construed as providing information about attentional and information-processing phenomena than as providing information about arousal. The more specific one is this: that the finding of decreased palmar sweat in the presence of a self-attention-inducing stimulus (Paulus et al., 1978) may most reasonably be interpreted in attentional terms, as reflecting inward focus of attention and the simultaneous suppression of environmental input.

*Cybernetics and the energizing of behavior.* In addition to constraints imposed by the complexity of the meaning of autonomic responses, another issue of logic should be addressed. This issue concerns the nature of cybernetic theory.

Among persons accustomed to think of behavior as being "energized" and thus impelled by some kind of drive, the idea that a control-theory model of motivation is truly adequate to explain variations in the intensity of behavior will seem difficult to accept. This is true even though a number of motivational psychologists (e.g., Guilford, 1965; Hunt, 1965; Taylor, 1960; Vickers, 1973) have for a number of years characterized the TOTE

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ever, taken up elsewhere (Carver & Scheier, Note 2). That paper also presents further data on the role of drive in social facilitation and self-awareness phenomena.

unit as the most promising model of motives leading to intentional activity.

The sticking point for many people seems to be the obvious fact that it takes energy to do work. Thus a drive model would seem to be preferable to a control-theory or a cybernetic one. But this view fails to recognize the fact that physiological changes that occur in the course of executing a behavior are in no way incompatible with cybernetic assumptions. Cybernetic theory would simply relegate the observed physiological change to a secondary causal role. As Guilford (1965) has noted, "In automated devices, as in living organisms, there is a clear distinction between two functions of energy. There is the energy that carries out the various operations, where work must be done, and there is the energy that has control functions, where triggering and release of much greater quantities of energy are involved" (p. 320). Cyberneticists would tend to emphasize the importance of the energy that has control functions, even though it is the work-doing energy that is most readily observed in terms of changes in physiological state. Thus Wiener argued long ago (1948) that the then-current focus on arousal was misguided, that the body is in fact very far from being a conservative system with limited energy available. He argued that the appropriate type of "bookkeeping" for events in the nervous system is not one that is energy based. Instead, the critical notions were those of message, quantity of information, coding technique, and so on.

It should be repeated, however, that the fact that physical work systems are subsidiary components of the body's control system has this important implication: Covariation of physiological change with behavioral change in no way constitutes a threat to a control-theory analysis of behavior regulation. In such an analysis, a change in physiological activity leads merely to the question of what specific functions are being performed, rather than the more misleading question of whether arousal exists. Indeed, for this reason it is arguable (see also Carver & Scheier, Note 2) that control theory provides a more subtle understanding of physiological events than does drive theory.

### *Prepotent Response Tendency*

There is a third distinction between the Duval and Wicklund (1972) model and the present model that should also be addressed. It bears on the following question. In a context in which a behavioral standard is salient, which response is prepotent when self-focus occurs: matching-to-standard or withdrawal? In the model proposed here, the matching-to-standard sequence is prepotent, as part of the human being's normal self-regulatory system. Withdrawal occurs only after an outcome assessment and only if that assessment yields a negative expectancy. In contrast, although Duval and Wicklund (1972) originally felt that it was not possible to know which of these two modes would be preferred, Wicklund later argued for an ordering opposite to that assumed in the present model. "Certainly a successful averting of self-focused attention would eliminate the negative affect, however temporarily; thus an individual's immediate reaction to objective self-awareness should be an avoidance of self-focusing stimuli and/or efforts to find distractions" (Wicklund, 1975a, p. 236). Thus, according to Wicklund, discrepancy reduction occurs only when self-focus cannot be avoided.

Results of two recent studies (Carver, Blaney, & Scheier, in press; McDonald, in press) suggest that the present analysis is the more accurate of the two. In McDonald's research, subjects in whom a large negative within-self discrepancy had been made salient were more persistent on a subsequent task (for which persistence had been defined as appropriate) when self-focus was increased than when it was not. Moreover, there was also evidence that this effect was exaggerated by instructions that the second task was relevant to the dimension on which the discrepancy had been created. The possibility that subjects had simply been distracting themselves from self-focus by burying themselves in their task was considered and rejected by McDonald, because of the fact that a much simpler and quicker means of avoiding self-focus was readily available but was not used, that is, announcing "I'm finished" and leaving the context. Thus McDonald con-

cluded that discrepancy reduction is prepotent under self-focus when a means of reducing the discrepancy is available.

The Carver et al. (in press) research was discussed earlier in this article, in the section on outcome expectancy. Some subjects in that research were led to have favorable expectancies of being able to reduce a large within-self discrepancy, others were led to have unfavorable expectancies. Subjects with favorable expectancies were more persistent when self-attention was high than when it was low, consistent with the McDonald (in press) results. Carver et al. rejected the possibility that this persistence represented attempted distraction for the same reason as had McDonald, that is, that there was an easier way to avoid self-focus readily available. Indeed, this point is further emphasized in the Carver et al. research by the fact that one group of subjects *did* utilize that way of avoiding self-focus—specifically, subjects with negative outcome expectancies. Thus those results appear to be unequivocal in supporting the present theory.

#### Other Theoretical Comparisons

The model proposed in this article also bears certain similarities to models in social psychology other than self-awareness theory. Three of the similarities are striking enough that they deserve some separate attention. The first of these concerns Bandura's recent (1977) analysis of fear-based avoidance behavior; the second concerns recent analyses of human helplessness (Abramson et al., 1978; Wortman & Brehm, 1975); the third concerns social comparison theory (Festinger, 1950, 1954). These similarities will be discussed in the following sections.

#### *Self-Efficacy and Avoidance*

The fact that the approach-withdrawal decision process postulated here has been framed in terms of outcome and efficacy expectancies suggests that some commonality may exist between the present model and Bandura's recent analysis of the role of self-efficacy expectancies in avoidance behavior (Bandura,

1977; Bandura, Adams, & Beyer, 1977). Bandura's analysis and the present one do share some common ground, but they also differ in important respects.

*Terminology.* The first difference is one of terminology (see Figure 4). Bandura used the term *outcome expectancy* to refer to "a person's estimate that a given behavior will lead to certain outcomes" (Bandura, 1977, p. 193). His primary concern was in distinguishing that belief from the expectancy that one can *execute* the behavior. This he labeled *efficacy expectancy*. Clinically, such a distinction is quite an important one. In many cases people know what behavior a situation requires but do not believe themselves capable of doing the behavior. Because efficacy expectancy was most clinically relevant and thus most important to Bandura, he devoted relatively little attention to defining and discussing outcome expectancy. Implicitly, however, outcome expectancy in Bandura's terms is based only on the presence or absence of knowledge about the normal consequences of a behavior. In the present model, in contrast, the term outcome expectancy is used to denote expectancy about an event's likelihood of occurrence. This usage quite explicitly includes a variety of inputs: knowledge of the normal consequences of task-appropriate behavior, constraints imposed by external forces or by the passage of time, and efficacy expectancy—one's judgment about whether or not one can execute the requisite behavior (Figure 4).

In the present model, therefore, outcome expectancy is the direct determinant of the person's subsequent behavior and affect (Propositions 11 and 12). Efficacy expectancy is merely one input into outcome expectancy, but one determining what cognitions are associated with affect experienced as a function of that outcome expectancy. In Bandura's model, in contrast, the person's efficacy judgment is the direct determinant of his or her subsequent behavior. Outcome expectancy can be seen as a partial—though often trivial—determinant of efficacy expectancy in Bandura's model (Figure 4) in that one cannot feel capable of doing a behavior unless one knows the behavior and what its ordinary consequences are.

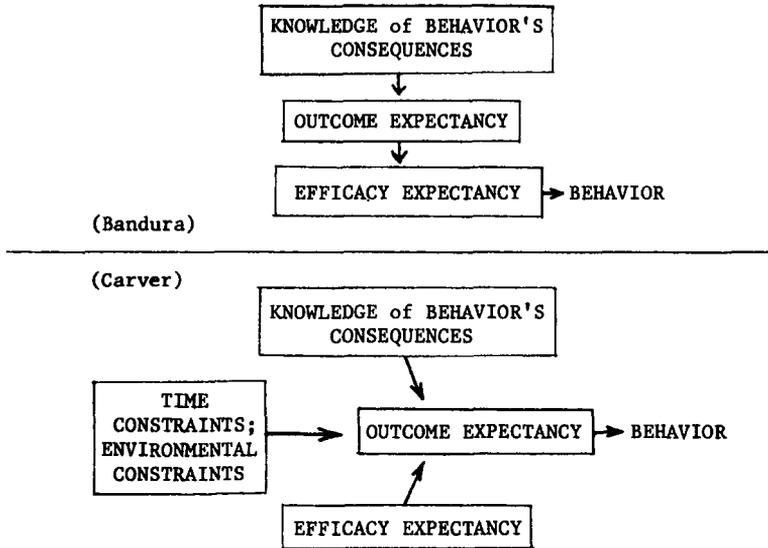


Figure 4. Relationships among outcome expectancy, efficacy expectancy, and behavior, as conceptualized by Bandura (1977) and Carver.

The models are in somewhat closer agreement with regard to the nature and determinants of efficacy expectancy. Bandura conceived of efficacy expectancy as being a product of four classes of information: prior performance accomplishments, vicarious experiences, verbal instructions, and emotional arousal. An additional set of relevant information would seem to be the degree to which one perceives that one can separate a behavior into components, each of which may be manageable by itself. These various sources of information (involving both previously encoded stimuli and presently experienced stimuli) are processed together, yielding a judgment of efficacy expectancy.

*Role of emotional arousal.* Even with regard to the determinants of efficacy expectancy, however, there is a point of conflict between the models: specifically, the role that is assumed to be played by the perception of emotional arousal. As was noted in the preceding paragraph, Bandura (1977) held that fear arousal was one kind of input into efficacy expectancy. Although this position has been moderated to take into account attributional contingencies (Bandura et al., 1977), there still appears to be a difference between Bandura's position and the position taken in the model proposed here. The present model

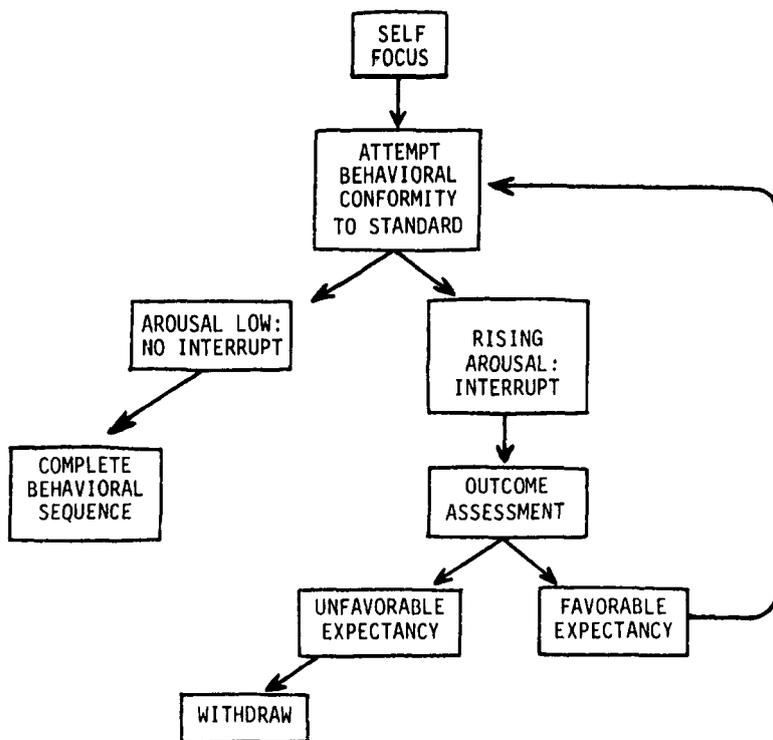
holds that the role of perceptions of fear arousal in an approach attempt (initially, at least) is to cue the self-assessment process (see Figure 5). This assessment results in an outcome expectancy judgment, which for fear-based behavior is largely determined by efficacy expectancy (which derives, in turn, from the other informational sources enumerated by Bandura, 1977). This expectancy determines whether the person subsequently withdraws or returns to the approach attempt.

This analysis has received empirical support in three studies. Carver and Blaney (1977a, Experiment 3; 1977b) showed that persons who differed only in their chronic efficacy expectancies responded to false feedback of arousal in two quite different ways. Confident subjects focused on their approach attempt and were not debilitated behaviorally; doubtful subjects avoided focusing on the approach attempt and withdrew more quickly, compared to doubtful subjects given feedback of nonarousal. This interactive influence of fear perceptions on focus of attention and behavior—a set of findings that has subsequently been conceptually replicated using a self-awareness manipulation to heighten awareness of veridical fear (Carver et al., 1979)—does not seem easy to predict from Bandura's assumptions. The findings are, how-

ever, clearly predicted from the present model of self-attention processes.

*Generality.* A final useful comparison between the theories concerns their relative generality. Bandura's (1977) analysis was aimed quite explicitly at fear-related behavior and the therapeutic change of such behavior. In applying the two models to situations in which the likelihood of a positive outcome is entirely dependent on *intrapersonal* factors, which is the case in fear-based behavior, the two are functionally equivalent. This is true because outcome and efficacy expectancies as defined in the present model are perfectly confounded with each other in this particular class of situations. A consideration of broader contexts reveals, however, that the present model is more general in two respects than is Bandura's. First, because outcome expectancy is not held to be determined solely by knowledge of the task-appropriate behavior, the present model can generate predictions for

two classes of behavioral interruptions not considered by Bandura: incomplete or inadequate behavior that occurred in the past and behavior constrained by environmental factors (see Figure 3). Secondly, since efficacy expectancy is held to exert an influence on behavior that is independent of outcome expectancy, the present model explicitly predicts that different affective experiences will be associated with similar behavioral events, based on differences in efficacy expectancy. That is, Proposition 13 above holds that if there is negative outcome expectancy, the presence of high efficacy perceptions predicts that affect will occur as resentment toward the environment; presence of low efficacy perceptions predicts negative affect associated with the self. If outcome expectancy is favorable, low efficacy perceptions predict that positive affect will be associated with the environment; high efficacy perceptions predict that the affect will be associated with the self. These



*Figure 5.* Information-processing sequence following self-attention in a fear-provoking behavioral context. (This sequence represents a specialized application of the model of behavioral regulation that was presented in Figure 3.)

predictions, which are now being tested, do not seem to be derivable from Bandura's (1977) theory.

### *Helplessness Theory*

The present theoretical model also appears to have some implications for the area of research and theory known as "learned helplessness." Helplessness is a performance deficit that reflects presumed motivational, cognitive, or learning deficits resulting from fairly extended exposure to uncontrollable outcomes. There is at least one important similarity between aspects of the present model and the kind of cognitive analysis developed in recent years to account for helplessness effects among humans (e.g., Abramson et al., 1978; Wortman & Brehm, 1975). Abramson et al. (1978), for example, have proposed that the impact of uncontrollability on subsequent performance depends upon the development of an *expectation of future noncontingency*. Similarly, Wortman and Brehm (1975) have argued that helplessness occurs when the person has an *expectancy of no control* for a task being undertaken. Both of these characterizations are quite similar to what has been termed in the present article an *unfavorable outcome expectancy* regarding the subsequent task.

Abramson et al. held that this expectancy is influenced largely by attributions concerning the reason for the initial failure. In fact, this attributional aspect of their model has received by far the greatest amount of attention among researchers in that area. Despite this, however, it bears emphasizing that the direct determinant of performance in their theory, as in Wortman and Brehm's, is the person's expectancy, not the attributions. If one has an unfavorable expectancy, regardless of the reason, helplessness should result. If one's expectancy is favorable, there should be no helplessness.

The central emphasis accorded to expectancy by these theorists is quite consistent with the model presented in this article. Indeed, one study conducted to test the model (Carver et al., in press, discussed in detail earlier) could be regarded quite easily as a

helplessness experiment. Subjects underwent a failure pretreatment, and some of them later displayed reduced persistence, which is often taken as a sign of helplessness. In providing support for the present model, that research thus also appears to offer support for other models of helplessness that rely on postulates about expectancies.

However, that research also suggests two respects in which the present model adds to such theories of helplessness. The more obvious contribution of this model stems from the fact that no other analysis of helplessness effects includes any consideration of the role of self-directed attention in promoting such effects. As is demonstrated in the Carver et al. (in press) research, that role may be quite an important one.

The second contribution of the present theory is its suggestion that the impulse to withdraw is basic to a wide variety of helplessness effects. The assumption of a withdrawal impulse is inherent in the present model. And it was overt withdrawal that was displayed in the Carver et al. (in press) research. In contrast, most studies in the helplessness tradition do not explicitly allow subjects this behavioral option. As was suggested earlier in this article, however, when physical withdrawal is prevented, the result may be a *cognitive* withdrawal—a mental dissociation from task attempts. This characterization seems consistent with typical helplessness effects, which often reflect an apparent unwillingness or inability to utilize task-relevant cues. An interesting possibility that should be examined further is that all these effects may stem from a thwarted impulse to remove oneself from the behavioral context.

### *Social Comparison Theory*

Earlier in this article it was noted that there is also considerable similarity between some aspects of the present theory and social comparison theory (Festinger, 1950, 1954).<sup>18</sup> Social comparison theory can be viewed as

<sup>18</sup> Although this similarity exists for Duval and Wicklund's theory, as well as for the present model, this discussion will focus on the present model.

having three central assumptions. The first is that we tend to define much of reality—especially our social reality—by comparing our own opinions, reactions, characteristics, and capabilities with those of other people, usually termed *reference groups*. The second assumption is that the tendency to do this is exaggerated by conditions of ambiguity. The third assumption is that once consensus has been reached and some normative value implicitly established, then there is pressure toward conformity to this value among the members of the group.

Holding in abeyance the role of perceived ambiguity in the instigation of these processes, the elements of social comparison theory thus seem to fulfill two functions: first, to establish some value as a standard of comparison (by means of an implicit social consensus), and second, to increase behavioral conformity to that standard. These two functions are, of course, precisely the same as those assumed in a control-theory model of behavioral self-regulation such as the one proposed here. That is, a control-theory approach to motivation assumes two kinds of information-processing systems. The first of these is the system that analyzes and categorizes perceptual input, yielding a behavioral standard. The second system—a TOTE unit—regulates behavior with regard to that standard.

One way in which social comparison theory is similar to the model proposed here concerns the first stage of social comparison, in which a standard is established by implicit social consensus. This aspect of that model would seem to represent one important way in which a person can extract a behavioral standard through categorization of his or her environmental context (Propositions 2 and 3 of the present model). This may indeed be one of the most commonly used methods of choosing a behavior among human adults. In principle, however, it represents only a subset of a larger class of potential ways to determine behavior. Thus, it would seem that this facet of social comparison theory could be subsumed under the more general process of categorizing the nature of one's context (a process that certainly deserves much more

attention than it has received in the present article).<sup>19</sup>

The second stage of the social comparison process, in which conformity pressure occurs, is also functionally similar to a major facet of the present model. The difference between the two is in the locus assumed for the impetus to conform. In the present model, the conformity tendency (via the normal matching-to-standard sequence) is construed as internally based. Discussions of social comparison theory, in contrast, often seem to assume the existence of external pressure to conform.

Finally, it seems worthy of brief note that a subsidiary aspect of social comparison theory holds that if a person cannot conform to the group's standard, there is a tendency for either the group or the person to withdraw from the other. This seems not unlike the present proposition that when one cannot match one's behavior to the standard—that is, when outcome expectancy is unfavorable—there is an impulse to withdraw from the attempt.

#### Summary and Concluding Comment

In the preceding pages, a cybernetic model of self-attention processes was presented, along with support for its propositions. Summarized briefly, self-focus in a context where no behavioral standard is salient leads to heightened cognizance of salient self-elements. Self-focus when a behavioral standard does exist leads to an automatic matching-to-standard sequence. This sequence is regarded as the realization within a psychological system of a negative feedback loop. If matching-to-standard is interrupted, an outcome assessment ensues. A favorable outcome perception

<sup>19</sup> The assumption in social comparison theory that ambiguity increases the tendency to undertake social comparison suggests another possibility not previously addressed in this article. That is, it may be a more general rule that ambiguity leads to increased information search, even when the context is non-social, in order to determine better what behavior is appropriate. This possibility certainly should receive more attention. If confirmed, it would further increase the degree to which these two analyses overlap.

leads to positive affect and/or to a return to matching-to-standard. An unfavorable outcome perception leads to negative affect and/or behavioral withdrawal.

Following presentation of the model, three specific points of conflict between this theory and self-awareness theory were addressed. In each of those cases, evidence was reviewed that indicated the present analysis to be the more internally consistent and parsimonious of the two. Comparisons also were undertaken between the present model and three other theories: Bandura's analysis of cognitive processes underlying fear-related behavior, helplessness theory, and social comparison theory. Each of those comparisons revealed the possibility for considerable integration between models.

There are many other potential links that could be developed between the present theory and information-processing ideas currently under investigation elsewhere in social and cognitive psychology. A fairly obvious example is the similarity between the propositions of the present model that concern salience of oneself versus the environment and research conducted on other kinds of salience phenomena (see, e.g., Taylor & Fiske, 1978). Although there simply is not the space to pursue those interrelationships here, the existence of such commonalities among theories suggests that the ideas on which the present model is based have a good deal of integrative potential. Indeed, this seems apparent even if one considers only the material discussed in this paper. The model of self-attention processes presented here has proven to be applicable to a wide range of phenomena, topics as diverse as taste and test anxiety, in a way that is internally consistent. It is to be hoped, moreover, that this perspective will prove to be useful in generating additional hypotheses, beyond those considered in the preceding pages. Thus might the specific ideas advanced here, and the concepts of control theory more generally, come to be seen as important tools for the analysis of a broad range of long-standing problems in human behavior.

#### Reference Notes

1. Slapion, M., & Carver, C. S. *Self-directed attention and facilitation of intellectual performance among*

*persons high in test anxiety*. Manuscript submitted for publication, 1979.

2. Carver, C. S., & Scheier, M. F. *The self-attention-induced feedback loop and human motivation: A control-systems analysis of social facilitation*. Manuscript submitted for publication, 1979.

#### References

- Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology*, 1978, 87, 49-74.
- Appley, M. H. Derived motives. In P. H. Mussen & M. R. Rosenzweig (Eds.), *Annual review of psychology* (Vol. 21). Palo Alto, Calif.: Annual Reviews, 1970.
- Apter, M. J. *The computer simulation of behavior*. New York: Harper Colophon, 1970.
- Bandura, A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 1977, 84, 191-215.
- Bandura, A., Adams, N. E., & Beyer, J. Cognitive processes mediating behavioral change. *Journal of Personality and Social Psychology*, 1977, 35, 125-139.
- Barker, R. G., *Ecological psychology: Concepts and methods for studying the environment of human behavior*. Palo Alto, Calif.: Stanford University Press, 1968.
- Berlyne, D. E. Motivational problems raised by exploratory and epistemic behavior. In S. Koch (Ed.), *Psychology: A study of a science* (Vol. 5). New York: McGraw-Hill, 1963.
- Borkovec, T. D., & O'Brien, G. T. Relation of autonomic perception and its manipulation to the maintenance and reduction of fear. *Journal of Abnormal Psychology*, 1977, 86, 163-171.
- Brehm, J. W. *A theory of psychological reactance*. New York: Academic Press, 1966.
- Brehm, J. W., & Brehm, M. L., In J. W. Brehm (Ed.), *A theory of psychological reactance*. New York: Academic Press, 1966.
- Buckley, W. *Modern systems research for the behavioral scientist*. Chicago: Aldine, 1968.
- Buss, D. M., & Scheier, M. F. Self-awareness, self-consciousness, and self-attribution. *Journal of Research in Personality*, 1976, 10, 463-468.
- Cantor, N., & Mischel, W. Traits as prototypes: Effects on recognition memory. *Journal of Personality and Social Psychology*, 1977, 35, 38-48.
- Carroll, J. S. The effect of imagining an event on expectations for the event: An interpretation in terms of the availability heuristic. *Journal of Experimental Social Psychology*, 1978, 14, 88-96.
- Carver, C. S. Facilitation of physical aggression through objective self-awareness. *Journal of Experimental Social Psychology*, 1974, 10, 365-370.
- Carver, C. S. Physical aggression as a function of objective self-awareness and attitudes toward punishment. *Journal of Experimental Social Psychology*, 1975, 11, 510-519.
- Carver, C. S. Self-awareness, perception of threat, and

- the expression of reactance through attitude change. *Journal of Personality*, 1977, 45, 501-512.
- Carver, C. S., & Blaney, P. H. Avoidance behavior and perceived arousal. *Motivation and Emotion*, 1977, 1, 61-73. (a)
- Carver, C. S., & Blaney, P. H. Perceived arousal, focus of attention, and avoidance behavior. *Journal of Abnormal Psychology*, 1977, 86, 154-162. (b)
- Carver, C. S., Blaney, P. H., & Scheier, M. F. Focus of attention, chronic expectancy, and responses to a feared stimulus. *Journal of Personality and Social Psychology*, 1979, 37, 1186-1195.
- Carver, C. S., Blaney, P. H., & Scheier, M. F. Re-assertion and giving up: The interactive role of self-directed attention and outcome expectancy. *Journal of Personality and Social Psychology*, in press.
- Carver, C. S., & Scheier, M. F. Self-focusing effects of dispositional self-consciousness, mirror presence, and audience presence. *Journal of Personality and Social Psychology*, 1978, 36, 324-332.
- Carver, C. S., & Scheier, M. F. Self-consciousness and reactance. *Journal of Research in Personality*, in press.
- Dabbs, J. M., Jr., Johnson, J. E., & Leventhal, H. Palmar sweating: A quick and simple measure. *Journal of Experimental Psychology*, 1968, 78, 347-350.
- Davis, D., & Brock, T. C. Use of first person pronouns as a function of increased objective self-awareness and prior feedback. *Journal of Experimental Social Psychology*, 1975, 11, 381-388.
- Diggory, J. C. *Self-evaluation: Concepts and studies*. New York: Wiley, 1966.
- Duval, S., & Wicklund, R. A. *A theory of objective self-awareness*. New York: Academic Press, 1972.
- Duval, S., & Wicklund, R. A. Effects of objective self-awareness on attribution of causality. *Journal of Experimental Social Psychology*, 1973, 9, 17-31.
- Duval, S., Wicklund, R. A., & Fine, R. L. Avoidance of objective self-awareness under conditions of high and low intra-self discrepancy. In S. Duval & R. A. Wicklund (Eds.), *A theory of objective self-awareness*. New York: Academic Press, 1972.
- Exner, J. E., Jr. The self-focus sentence completion: A study of egocentricity. *Journal of Personality Assessment*, 1973, 37, 437-455.
- Festinger, L. Informal social communication. *Psychological Review*, 1950, 57, 271-282.
- Festinger, L. A theory of social comparison processes. *Human Relations*, 1954, 7, 114-140.
- Franks, J. J., & Bransford, J. D. Abstraction of visual patterns. *Journal of Experimental Psychology*, 1971, 90, 65-74.
- Fredericksen, N. Toward a taxonomy of situations. In P. M. Insel & R. H. Moos (Eds.), *Issues in social ecology: Human milieu*. Palo Alto, Calif.: National Press Books, 1974.
- Froming, W. J. The relationship of moral judgment, self-awareness, and sex to compliance behavior. *Journal of Research in Personality*, in press.
- Geen, R. G., & Gange, J. J. Drive theory of social facilitation: Twelve years of theory and research. *Psychological Bulletin*, 1977, 84, 1267-1288.
- Geller, V., & Shaver, P. Cognitive consequences of self-awareness. *Journal of Experimental Social Psychology*, 1976, 12, 99-108.
- Gibbons, F. X. Sexual standards and reactions to pornography: Enhancing behavioral consistency through self-focused attention. *Journal of Personality and Social Psychology*, 1978, 36, 976-987.
- Gibbons, F. X., Carver, C. S., Scheier, M. F., & Hormuth, S. Self-focused attention and the placebo effect: Fooling some of the people some of the time. *Journal of Experimental Social Psychology*, 1979, 15, 263-274.
- Guilford, J. P. Motivation in an informational psychology. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 20). Lincoln: University of Nebraska Press, 1965.
- Gump, P. V. The behavior setting: A promising unit for environmental designers. *Landscape Architecture*, 1971, 61, 130-134.
- Hare, R. D., & Blevings, G. Conditioned orienting and defensive responses. *Psychophysiology*, 1975, 12, 289-297.
- Hull, J. G., & Levy, A. S. The organizational functions of the self: An alternative to the Duval and Wicklund model of self-awareness. *Journal of Personality and Social Psychology*, 1979, 37, 756-768.
- Hunt, J. McV. Intrinsic motivation and its role in psychological development. In D. Levine (Ed.), *Nebraska Symposium on Motivation* (Vol. 20). Lincoln: University of Nebraska Press, 1965.
- Ickes, W. J., Wicklund, R. A., & Ferris, C. B. Objective self-awareness and self-esteem. *Journal of Experimental Social Psychology*, 1973, 9, 202-219.
- Johnson, J. E., & Dabbs, J. M., Jr. Enumeration of active sweat glands: A simple physiological indicator of psychological changes. *Nursing Research*, 1967, 16, 273-276.
- Kuhn, A. *The logic of social systems*. San Francisco: Jossey-Bass, 1974.
- Kuiper, N. A., & Rogers, T. B. Encoding of personal information: Self-other differences. *Journal of Personality and Social Psychology*, 1979, 37, 499-514.
- Lacey, J. I. Somatic response patterning and stress: Some revisions of activation theory. In M. H. Appley & R. Trumbull (Eds.), *Psychological stress*. New York: Appleton-Century-Crofts, 1967.
- Leventhal, H. Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), *Advances in experimental social psychology*. (Vol. 5). New York: Academic Press, 1970.
- Lewin, K. *A dynamic theory of personality*. New York: McGraw-Hill, 1935.
- Liebling, B. A., Seiler, M., & Shaver, P. Self-awareness and cigarette-smoking behavior. *Journal of Experimental Social Psychology*, 1974, 10, 325-332.
- MacKay, D. Mindlike behavior in artefacts. In K. M. Sayre & F. J. Crosson (Eds.), *The modeling of mind: Computers and intelligence*. Notre Dame, Ind.: University of Notre Dame Press, 1963.
- Markus, H. Self-schemata and processing information about the self. *Journal of Personality and Social Psychology*, 1977, 35, 63-78.
- Martens, R. Palmar sweating and the presence of an

- audience. *Journal of Experimental Social Psychology*, 1969, 5, 371-374. (a)
- Martens, R. Audience effects on learning and performance. *Journal of Personality and Social Psychology*, 1969, 12, 252-260. (b)
- McDonald, P. J. Reactions to objective self-awareness. *Journal of Research in Personality*, in press.
- Miller, G. A., Galanter, E., & Pribram, K. H. *Plans and the structure of behavior*. New York: Holt, Rinehart & Winston, 1960.
- Neisser, U. *Cognition and reality*. San Francisco: Freeman, 1976.
- Neumann, P. G. An attribute frequency model for the abstraction of prototypes. *Memory & Cognition*, 1974, 2, 241-248.
- Newcomb, T. M. Attitude development as a function of reference groups: The Bennington study. In E. E. Maccoby, T. M. Newcomb, & E. L. Hartley (Eds.), *Readings in social psychology*. New York: Holt, Rinehart & Winston, 1958.
- Paulus, P. B., Annis, A. B., & Risner, H. T. An analysis of the mirror-induced self-awareness effect. *Bulletin of the Psychonomic Society*, 1978, 12, 8-10.
- Posner, M. I. Abstraction and the process of recognition. In G. H. Bower & J. T. Spence (Eds.), *The psychology of learning and motivation* (Vol. 3). New York: Academic Press, 1969.
- Posner, M. I., & Rogers, M. G. K. Chronometric analysis of abstraction and recognition. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes* (Vol. 5). Hillsdale, N.J.: Erlbaum, 1978.
- Powers, W. T. *Behavior: The control of perception*. Chicago: Aldine, 1973.
- Powers, W. T. Quantitative analysis of purposive systems: Some spadework at the foundations of scientific psychology. *Psychological Review*, 1978, 85, 417-435.
- Pryor, J. B., Gibbons, F. X., Wicklund, R. A., Fazio, R. H., & Hood, R. Self-focused attention and self-report validity. *Journal of Personality*, 1977, 45, 513-527.
- Reitman, J. S., & Bower, G. H. Storage and later recognition of exemplars of concepts. *Cognitive Psychology*, 1973, 4, 194-206.
- Rogers, T. B., Kuiper, N. A., & Kirker, W. S. Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology*, 1977, 35, 677-688.
- Rogers, T. B., Rogers, P. J., & Kuiper, N. A. Evidence for the self as a cognitive prototype: The "false alarms effect." *Personality and Social Psychology Bulletin*, 1979, 5, 53-56.
- Schank, R., & Abelson, R. *Scripts, plans, goals and understanding*. New York: Halsted, 1977.
- Scheier, M. F. Self-awareness, self-consciousness, and angry aggression. *Journal of Personality*, 1976, 44, 627-644.
- Scheier, M. F., Buss, A. H., & Buss, D. M. Self-consciousness, self-report of aggressiveness, and aggression. *Journal of Research in Personality*, 1978, 12, 133-140.
- Scheier, M. F., & Carver, C. S. Self-focused attention and the experience of emotion: Attraction, repulsion, elation, and depression. *Journal of Personality and Social Psychology*, 1977, 35, 624-636.
- Scheier, M. F., Carver, C. S., & Gibbons, F. X. Self-directed attention, awareness of bodily states, and suggestibility. *Journal of Personality and Social Psychology*, in press. (a)
- Scheier, M. F., Carver, C. S., & Gibbons, F. X. Self-focused attention and reactions to fear. *Journal of Research in Personality*, in press. (b)
- Scheier, M. F., Carver, C. S., Schulz, R., Glass, D. C., & Katz, I. Sympathy, self-consciousness, and reactions to the stigmatized. *Journal of Applied Social Psychology*, 1978, 8, 270-282.
- Scheier, M. F., Fenigstein, A., & Buss, A. H. Self-awareness and physical aggression. *Journal of Experimental Social Psychology*, 1974, 10, 264-273.
- Simonov, P. V. The informational theory of emotion. In M. Arnold (Ed.), *Feelings and emotions: The Loyola Symposium*. New York: Academic Press, 1970.
- Singh, J. *Great ideas in information theory, language, and cybernetics*. New York: Dover, 1966.
- Snyder, M. L., & Wicklund, R. A. Prior exercise of freedom and reactance. *Journal of Experimental Social Psychology*, 1976, 12, 120-130.
- Sokolov, Y. N. *Perception and the conditioned reflex*. New York: Macmillan, 1963.
- Steenbarger, B. N., & Aderman, D. Objective self-awareness as a non-aversive state: Effect of anticipating discrepancy reduction. *Journal of Personality*, in press.
- Stotland, E. *The psychology of hope*. San Francisco: Jossey-Bass, 1969.
- Taylor, D. W. Toward an information-processing theory of motivation. In M. R. Jones (Ed.), *Nebraska Symposium on Motivation* (Vol. 8). Lincoln: University of Nebraska Press, 1960.
- Taylor, S. E., & Fiske, S. T. Salience, attention, and attribution: Top of the head phenomena. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 11). New York: Academic Press, 1978.
- Turing, A. M. Computing machinery and intelligence. *Mind*, 1950, 59, 433-460.
- Vallacher, R. Objective self-awareness and the perception of others. *Personality and Social Psychology Bulletin*, 1978, 4, 63-67.
- Vickers, G. Motivation theory—a cybernetic contribution. *Behavioral Science*, 1973, 18, 242-249.
- Wicklund, R. A. *Freedom and reactance*. Potomac, Md.: Erlbaum, 1974.
- Wicklund, R. A. Objective self-awareness. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 8). New York: Academic Press, 1975. (a)
- Wicklund, R. A. Discrepancy reduction or attempted distraction? A reply to Liebling, Seiler, and Shaver. *Journal of Experimental Social Psychology*, 1975, 11, 78-81. (b)
- Wicklund, R. A., & Duval, S. Opinion change and performance facilitation as a result of objective self-awareness. *Journal of Experimental Social Psychology*, 1971, 1, 319-342.

- Wiener, N. *Cybernetics: Control and communication in the animal and the machine*. Cambridge, Mass.: M.I.T. Press, 1948.
- Wiener, N. *The human use of human beings: Cybernetics and society*. New York: Avon Books, 1954.
- Williams, R. B., Bittker, T. F., Buchsbaum, M. S., & Wynne, L. C. Cardiovascular and neurophysiologic correlates of sensory intake and rejection. I: Effect of cognitive tasks. *Psychophysiology*, 1975, 12, 427-433.
- Wine, J. D. Test anxiety and direction of attention. *Psychological Bulletin*, 1971, 76, 92-104.
- Wortman, C. B., & Brehm, J. W. Responses to uncontrollable outcomes: An integration of reactance theory and the learned helplessness model. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 8). New York: Academic Press, 1975.

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