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The effect of objective self-awareness on judgments of noncontingent act-outcome relations

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THE EFFECT OF OBJECTIVE SELF-AWARENESS ON JUDGMENTS OF NONCONTINGENT ACT-OUTCOME RELATIONS

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To

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ABSTRACT

THE EFFECT OF OBJECTIVE SELF-AWARENESS ON
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Female college students' perceptions of control over outcomes were examined in a high outcome, noncontingent, bivariate, act-outcome task. Logit regression revealed that the odds of judging low control and the odds of judging no relation increased when subjects performed the task in the presence of self-focusing stimuli. When subjects performed the task in front of a mirror, or in the presence of a video camera or an observer, the odds of judging low control increased by a factor of 2.57, 2.74, and 2.74 respectively. Subjects in the mirror, camera, and observer conditions also judged "no relation" between actions and outcomes with greater frequency; the odds of judging no relation in the mirror, camera, and observer condition increased by a factor of 1.78, 3.14, and 3.43, respectively. Measures of depression and individual differences in self-consciousness predicted neither low judgments of control nor judgments of "no relation." Linear regression on measures of control judgment accuracy indicated that self-aware subjects also judged control accurately with respect to the objective contingency of act-outcome events. The results of this experiment demonstrate that self-aware subjects performing in a noncontingent judgment of control task are less susceptible to the illusion of control than those not self-aware.

INTRODUCTION

The importance of perceived control for adaptive functioning is well documented (cf. Alloy & Tabachnik, 1984). With a few exceptions, increased perceived control is associated with reduced pain and anxiety, fewer problem solving deficits, and less susceptibility to numerous health related problems. Despite the apparent importance of perceived control, research has indicated that human assessments of control are sometimes inaccurate when compared to normative standards of judgment (Abramson & Alloy, 1980; Alloy & Abramson, 1979; Jenkins & Ward, 1965).

Past research has shown that the accuracy of control judgments varies greatly depending on conditions. Factors such as the mood of the subject (Alloy & Abramson, 1979), the representation of variables (Allan & Jenkins, 1983), outcome probability (Jenkins & Ward, 1965), observer presence (Benassi & Mahler, 1985), context (Newman & Benassi, 1989), and the objective contingency of the problem (Alloy & Abramson, 1979) affect judgment accuracy.

Biased control judgments are often evident when objective contingencies between actions and outcomes approach zero. Research investigating control judgments in noncontingent conditions has shown that people often exhibit the "illusion of control," judging events as controllable when they are not (Alloy & Abramson, 1979; Langer, 1975). The present research examines noncontingent control judgments in the context of self-awareness, a psychological state that may ameliorate

the illusion of control.

Self-awareness occurs when attention is directed to the self as an object in the environment (Duval & Wicklund, 1972). Over the past two decades, theory and research have documented the effect of self-awareness on judgment (e.g., Carver & Scheier, 1981; Duval & Wicklund, 1972; Gibbons, 1990; Wicklund, 1975, 1979). In general, self-awareness has increased the accuracy of causal attributions (Gibbons & Gaeddert, 1984), increased awareness of internal states (Scheier, 1976), decreased the tendency to conform when personal standards for behavior are high (Gibbons & Wright, 1983), increased the tendency to conform when standards are ambiguous (Duval, 1976), increased the correlation between attitudes and behavior (Greenberg & Musham, 1981), and increased the veridicality of self-report (Gibbons, 1990).

The present research examines the effect of self-awareness on judgments of control in a bivariate, noncontingent, act-outcome task. The dependent measures are judgments of control on a zero to 100 point scale, binary (yes/no) judgments of relation, and a derived accuracy variable (judgment of control minus the empirical correlation). The present study predicts that the illusion of control will be ameliorated when subjects judge control in the presence of self-focusing stimuli.

I. SELF-AWARENESS

Research on the self-concept during the last two decades has contributed significantly to progress in the development of theories of personality and social psychology (Kihlstrom, Cantor, Albright, Chew, Klein, & Niedenthal, 1988; Markus & Wurf, 1987). The self, once considered a crude, insensitive, and undifferentiated personality construct that was generally ineffective in mediating behavior (Wylie, 1974), is now seen as an active, multifaceted, dynamic structure that mediates many processes related to human thought and action (Markus & Wurf, 1987). A concept that has contributed to this change of perspective is self-awareness that results from self-focused attention.

Objective Self-awareness

Although the concept of self-awareness has existed in one form or another for more than a century (Cooley, 1902; James, 1890; Mead, 1934), the initial systematic statement of self-awareness and self-focused attention was developed by Duval and Wicklund (1972) as objective self-awareness. The original theory of objective self-awareness was primarily motivational, neglecting to account for cognitive factors. Subsequent models (e.g., Carver & Scheier, 1981), however, have contributed to objective self-awareness by incorporating aspects of information processing theory, particularly schema theory, with the original model. The theory of objective self-awareness has generated considerable empirical research and has sustained several

theoretical revisions (Carver & Scheier, 1981; Hull & Levy, 1979; Gibbons, 1990; Wicklund, 1975, 1979, 1980).

Self-focused Attention

In the theory of objective self-awareness, Duval and Wicklund (1972) distinguished between subjective and objective states of awareness. A person is objectively self-aware when the self is the object of consciousness or attention. The terms subjective and objective captured several assumptions related to the direction of conscious attention.

Duval and Wicklund (1972) assumed that attention is selective, dichotomous, and that it oscillates from the self to the environment. Attention is assumed to be selective in the sense that some properties of a stimulus are isolated or selected for more extensive processing (Broadbent, 1958; Treisman, 1969). Attention is also assumed to be dichotomous because, at any given time, attention may be focused outward, toward the environment, or inward, toward the self as an object (Duval & Wicklund, 1972; Wicklund, 1975). The focus of attention does not remain fixed on either the self or the the enviroment and it cannot be directed to the self and the environment simultaneously. Attention is assumed to oscillate from the self to the environment.

The conditions that evoke self-focus involve exposure to stimuli that remind people of their status as objects in the world (Duval & Wicklund, 1975). Stimuli that generate this effect include one's reflection in a mirror, the sound of one's voice, or viewing a picture

of oneself. Wicklund (1975) argued that any symbol or reflection of oneself initiates self-focus. In addition, audiences or other stimuli not directly symbolic of the self can initiate self-focus if a person realizes that he or she is the object of audience attention.

The Causal Agent Self

Prior to Duval and Wicklund (1972), self-awareness theories generally separated the subject of the perception--the "I"-- from its object--the "me" (Cooley, 1902; Hilgard, 1949; Greenwald, 1982; Greenwald & Pratkanis, 1984; Mead, 1934). Mead (1934), for example, distinguished between the "I" and the "me," saying that the "me" is the "I" reflected upon (the object), and the "I" is the actor in the present. The "I" and the "me" have been described as active/passive (Wylie, 1968), origin/pawn (de Charms, 1968), and egocentric/nonegocentric, respectively (Piaget, 1967).

In the theory of objective self-awareness, Duval and Wicklund (1972) argued against the concept of separate selves. They construed the self as a unified cognitive structure that functions as an action oriented causal agent. The causal agent self directs a person toward some goal by means of perception, thinking, and behavior. Duval and Wicklund (1972) maintained that the perception of the self as either "I" or "me" depends on the perception of the self as a causal agent. This perception changes as a result of self-focused attention.

Although environmentally-focused people perceive events and receive feedback from their environment, they receive little feedback regarding the role of the self as a causal agent. Environmentally-focused people, therefore, are relatively unaware of the objective role of the self as the cause and controller of events; i.e., they are relatively uncritical of their own behavior. When people encounter stimuli that remind them of themselves, however, attention is directed inward to the self as an object in the environment.

When attention is directed inward, the self becomes the object of consciousness resulting in a heightened sensitivity to the self as a object; i.e., the self becomes as a figure in the perceptual field (Duval & Wicklund, 1972). Duval and Wicklund (1972) maintained that the self appears passive and noncausal when it is the object of consciousness because the action complex that characterizes the self appears separated from the person. A self-aware person experiences feelings of distance between the action oriented, causal self and the passive, reflected upon, noncausal self.

In sum, according to Duval and Wicklund (1972), the perception of two different selves results from changes in the perception of the causal agent self due to self-focused attention. The self of the externally focused person is the action oriented, causal, and relatively uncritical perceiving self. In contrast, the self of the internally focused person is the passive, noncausal, perceived self.

Self-evaluation

Objective self-awareness is characterized by self-evaluation initiated by self-focused attention (Duval & Wicklund, 1972; Gibbons, 1990). When attention is directed toward the self, an evaluation process is evoked where a "real" self, conceptualized in terms of self-perceptions of current behavior and attitudes, is compared to an "ideal" self, conceptualized in terms of internalized standards.

The internal standard represents the criterion of measurement that is necessary for any evaluation. The standard is characterized as a representation, physical or ideational, of an object of the same category or class as the object being evaluated. For Duval and Wicklund (1972), the concept of internal standards was expressed in terms of standards of "correctness" or "moral oughtness." However, more recent expressions of self-awareness theory have reconceptualized internal standards in terms of social cognitive theory (Carver, 1978; Carver & Scheier, 1981; Powers, 1973). Carver and Scheier (1981), for example, characterized internal standards as information encoded in hierarchically arranged knowledge structures. No assumptions of moral correctness or oughtness are required. In this sense, standards are reference values with which current perceptions are compared.

Duval and Wicklund (1972) argued that the comparison of the "real" to the "ideal" usually results in a discrepancy that is manifested by negative affect (see also Wicklund, 1975). In essence, objective self-awareness and self-focused attention are characterized as the comparison or self-evaluation process (Gibbons, 1990). Behavior related to self-focused attention results from a motivation to reduce

the negative affect either by avoiding the self-aware state or by reducing the discrepancy (Duval & Wicklund, 1972).

Recent developments in self-awareness theory have questioned the assumption that self-focus results in negative affect due to increased awareness of discrepancies (Carver & Scheier, 1978; Carver & Scheier, 1981; Davis & Brock, 1975; Gibbons, 1990). Carver and Scheier (1978; 1981), for example, argued that self-awareness is not necessarily aversive and that experimental subjects are not always aware of discrepancies. They contended that discrepancy reduction occurs even in the absence of negative affect. The more recent cognitive theories are in agreement, however, with Duval and Wicklund (1972) regarding the primary mechanism of self-focused attention. That is, effects related to self-awareness stem from increased self-evaluation resulting in heightened attempts to reduce discrepancies between internal standards and perceptions of current reality.

In summary, two components of self-awareness theory are relevent to the present research on control judgments: the causal agent self and self-evaluation. Duval and Wicklund (1972) argued that, in contrast to the environmentally-focused person, the self-aware person feels passive and noncausal because the self appears separated from the action complex that characterizes it. The causal agent self component of the theory predicts, therefore, that self-aware subjects should make lower control judgments. The self-evaluation component also predicts lower control judgments if it is assumed that people maintain veridical standards or references for control as part of the self-schema. Increased self-awareness results in more frequent matching-to-standard

sequences where current perceptions are compared to veridical standards. Such comparisons should result in low judgments of control when objective act-outcome contingencies approach zero.

Individual Differences in Self-focus

The core of Duval and Wicklund's (1972) theory is the psychological state of objective self-awareness that results from self-focus. Because attentional focus oscillates between the environment and the self, the state of self-focus increases or decreases depending on the proportion of time that attention is allocated to the self versus the environment. Because self-focus exists as a matter of degree, Fenigstein, Scheier, and Buss (1975) considered the possibility that individuals could differ in the extent to which they are inclined to focus on the self.

Fenigstein et al. (1975) hypothesized that individuals vary according to a disposition to self-focus and they devised the self-consciousness scale as a measure of the inclination to focus on the self. Although Fenigstein et al. (1975) were guided by Duval and Wicklund (1972) and attempted to discover a unitary construct of the disposition to self-focus, analyses of scale items resulted in the conceptualization of two distinct constructs identified as public and private self-consciousness (Fenigstein, 1987). Fenigstein et al. (1975) argued that people differ in their disposition to self-focus and on the dimension of the self that is accessed during self-focus.

The essence of the distinction between public and private self-consciousness is a self of two distinct dimensions, public and private. The distinction is fundamentally no different from James' (1890) social and spiritual selves, respectively (Fenigstein, 1987). Private self-consciousness measures the disposition to focus on that aspect of the self dealing with the inner being, emotional states, and cognitive faculties (Fenigstein, 1987). Public self-consciousness, on the other hand, measures the disposition to focus on social aspects of the self, such as the recognition of abilities by others.

Some disagreement over the validity of the distinction between the public and private dimensions is noted in the literature. The strongest criticisms have been raised by Wicklund and Gollwitzer (1987) who argued that the public/private distinction is invalid. They contended that public self-consciousness is not an index of self-focused attention and would be more appropriately categorized as an index of social dependency.

Fenigstein (1987) noted that although the private and public subscales moderately correlate with one another (.23 to .44), the amount of shared variance (10% in most cases) is relatively small. This raises the possibility that the scales measure different constructs, not two sides of the same construct. In arguing that public self-consciousness is a measure of social dependency rather than self-attention, Wicklund and Gollwitzer (1987) noted that public self-consciousness is correlated with other social characteristics such as "other directedness" (Briggs, Cheek, & Buss, 1980), embarrassability (Edelmann, 1985), and audience anxiousness (Leary, 1983).

Other evidence of construct dissimilarity has been offered by Carver and Scheier (1987) who cite numerous studies that validate the behavioral distinctions between public and private self-consciousness. Fenigstein (1987) argued that many studies over the past decade have demonstrated that the subscales are uncorrelated with regards to behavioral effects. Finally, in his review of several models of self-focused attention, Gibbons (1990) concluded that the behavior of persons high in public self-consciousness does not reflect any of the observed or hypothesized behavior that characterizes self-focused persons; i.e., whatever it measures, public self-consciousness is not an index of a person's tendency to self-focus.

Behavior Related to Self-awareness

The theory of objective self-awareness contained four behavioral corollaries; later theoretical revisions resulted in an additional subcorollary (Wicklund, 1979, 1980). The corollaries include conformity, attribution, attitude-behavior discrepancy, and social facilitation. The subcorollary involves self-cognition.

The basic effect of self-focused attention is to increase the consistency between internal standards and behavior. Evidence presented in this section suggests that self-focused attention increases the accuracy of judgments of causality and responsibility, decreases the tendency to conform (when personal standards are high), increases the tendency to conform when standards are ambiguous, increases the correlation between attitudes and behavior, increases the awareness of internal states, and increases the veridicality of

self-reports (Gibbons, 1990).

Conformity. Objective self-awareness predicts that conformity should increase when a person is self-focused in a group (Duval & Wicklund, 1972). When an attitude or opinion is discrepant from that of a group, the theory predicts that the self-aware person will attribute the discrepancy to the self and will attempt to reduce that discrepancy by conforming to the majority (Duval & Wicklund, 1972; Duval, 1976). Gibbons (1990) contended, however, that although this tendency may be true in situations of low personal commitment or in the case of weak personal standards, conformity does not otherwise result from self-focused attention.

In studies of attitude change by Gibbons and Wright (1983) and Froming, Walker, and Lopyan (1982), self-focused subjects maintained beliefs that were related to stable personal standards in the face of opposition from a larger group. Conversely, self-focus seems to inhibit behavior that would have generated a personal discrepancy had that behavior occured (Gibbons, 1978). Gibbons (1990) argued that no research to date has shown that self-focused persons will conform to group pressure when personal standards are at issue.

Attribution. The hypothesized relation between self-focus and causal explanations stems from the assumption that attributions are guided by attention. That is, the object of attention is more likely to be afforded causal status than some other object. Duval (1971) reasoned, therefore, that attention focused on the self is more likely to result in an attribution to the self as the causal agent (Duval, 1971; Duval & Wicklund, 1972). In support of this assumption, Duval

and Wicklund (1973) found that self-aware people assumed more personal responsibility (i.e., ascribed cause to the self) for both positive and negative environmental outcomes than those not self-aware.

Problematic to the attention-attribution hypothesis, however, is research that suggests that self-awareness does not necessarily lead to self attribution (Cohen, Dowling, Bishop, and Maney 1985; Federoff & Harvey, 1976; Franzoi & Sweeney, 1986). Franzoi and Sweeney (1986), for example, conducted three experiments that tested the relation between dispositional self-focus and internal-external attributions. The investigators found no differences in causal ascriptions as a function of dispositional self-focus.

Gibbons (1990) argued that the attention-attribution assumption also fails to consider the accuracy of attributions. He contended that self-aware subjects should be more accurate in attributing causality when causality is determinable and should be less likely to succumb to attribution biases such as the "fundamental attribution error" (Ross, 1977). Several studies have supported the "accurate-attribution" hypothesis (Ellis & Holmes, 1982; Gibbons & Gaeddert, 1984; Reisenzein & Gattinger, 1982; Stephenson & Wicklund, 1983).

Stephenson and Wicklund (1983), for example, examined the effect of self-awareness on perspective taking and found that self-aware subjects were less likely to misattribute a group outcome to the self. Reizenzein and Gattinger (1982) conducted an experiment that heightened arousal using an ergometer. They determined that self-aware subjects were more likely to attribute correctly the cause of the arousal to the ergometer. Finally, Gibbons and Gaeddert (1984) examined the tendency

of subjects to misattribute arousal to one of two drugs. Results indicated that self-aware subjects did not misattribute arousal to either of the drugs or to a placebo.

In summary, the research on causal attribution suggests that self-awareness may result in internal attributions of causality in some situations, especially when the actual cause is indeterminable or personal involvement is low. In many other situations, however, self-awareness does not contribute to internal attributions. More importantly, when accuracy of causal ascriptions is considered, self-aware subjects attribute cause accurately and are not as likely to succumb to attributional biases.

Attitude-Behavior. The self-aware person is more likely to exhibit attitude-behavior consistency than the person who is not self-aware. The theory of objective self-awareness assumes that people maintain standards of consistency so that perceptions of attitude-behavior incongruency result in motivated attempts to reduce the discrepancy (Duval & Wicklund, 1972).

Numerous studies have supported the attitude-behavior corollary (Greenberg & Musham, 1981; Lepper, Zanna & Ableson, 1970; Scheier & Carver, 1980; Zanna & Aziza, 1976). Greenberg and Musham's (1981) subjects, for example, avoided self-focus when engaging in counter attitudinal behavior as compared to subjects performing attitude-consistent behavior. Gibbons (1990) argued that the drive for consistency is a dominant motive, overriding other conflicting response tendencies associated with self-focus (cf. Hormuth, 1982).

Social facilitation. The improvement of performance in the presence of an audience is termed social facilitation. Duval and Wicklund (1972) argued that the mini-theories of Zajonc (1965), Cottrell (1968), and Hency and Glass (1968) could easily be subsumed under the broader theoretical umbrella of objective self-awareness. Rejecting the need for concepts of general arousal, dominant and subordinate responses, and drive, Duval and Wicklund (1972) suggested that the phenomenon of social facilitation can be adequately explained by appealing to the relations between performance and self-evaluation.

Self-cognition. The theory of objective self-awareness implies that dimensions of the self made salient during self-focus become more accessible. In other words, self-understanding on a salient self-dimension increases with self-focus resulting in a more accurate, or veridical, self-report (Gibbons, 1990).

In a series of experiments, Pryor, Gibbons, Wicklund, Fazio, and Hood (1977) demonstrated the "veridicality effect": the tendency of self-focused subjects to report aspects of the self more veridically than those not self-focused. After responding to questions about social behavior, subjects were observed in actual social situations. Self-reports of social behavior in the self-focused condition were more predictive of actual behavior than were the responses of subjects in the environmentally-focused condition.

Implications of Self-awareness for Control Judgment

The evidence presented above suggests that self-awareness increases self-evaluation on dimensions of cognition, affect, and behavior. According to Gibbons (1983, 1990), increased self-evaluation motivates accurate responding, increases accessibility to information about the self, and inhibits the tendency to present the self favorably at the expense of self-report accuracy (see also Schlenker & Leary, 1982; Pryor et al., 1977; Exp. 2). In sum, self-awareness generaliy increases judgment accuracy. The question raised by the present research concerns whether the effect extends to control judgments that have been susceptible to error and inaccurate assessment.

II. JUDGING COVARIATION AND CONTROL

A control judgment is an assessment of the covariation between actions and outcomes. Covariation may be described in terms of the nature of the stimuli (continuous or discrete), the strength and direction of the relation, and subject involvement (passive or active).

Although some cognate terms, such as contingency, have causal implications, covariation does not necessarily imply causality or control (Alloy & Abramson, 1979; Jenkins & Ward, 1965). For example, when a subject passively observes ostensibly associated stimuli, the judgment of covariation may be either predictive, (Alloy, Abramson, & Kossman, 1980) or causal (Michotte, 1963). However, when a subject acts (or responds to a cue) and then observes an outcome, the covariation assessment has causal implications and is regarded as a judgment of control (Jenkins & Ward, 1965).

In the statistical sense, the strength of a relation describes the degree to which one event accompanies another; and direction indicates the relationship's valence, either positive or negative. Events may exhibit covariation ranging from zero (no relation) to ± 1 (perfect positive or perfect negative relation). Accuracy in judgment is usually assessed by comparing the covariation judgment to some mathematically derived criterion.

When a stimulus dimension is continuous, the Pearson r is the common statistical standard (Jennings, Amabile, & Ross, 1980). When judgments involve discrete binary stimuli, the data may be displayed in the four cells of a 2x2 contingency table. Statistical criteria for assessing the degree of relation are expressed as coefficients such as chi square, phi, or a family of delta coefficients (Allan, 1980). The standard used in most covariation research involving act-outcome relations is delta-p = $|p(A/O)-p(A/no\ O)|$, the absolute difference between the two conditional probabilities of an outcome given either an action or no action (Jenkins & Ward, 1965).

Detection and Assessment of Covariation and Control

Judgments may be considered accurate if they compare well with some objective or normative criteria, such as delta-p. Research using normative standards has indicated that humans are sensitive to covariation and make relatively accurate judgments of covariation and control (Alloy & Abramson, 1979; Inhelder & Piaget, 1958; Neunaber & Wasserman, 1986; Schustack & Sternberg, 1981; Wasserman & Shaklee, 1984). People judge covariation and control more or less accurately, however, depending on conditions.

The accuracy of covariation and control judgments has been affected by numerous conditions such as the objective contingency of the problem (e.g., Alloy & Abramson, 1979; Wasserman & Shaklee, 1984), the mood of the subject (e.g., Alloy & Abramson, 1979), the representation of variables (e.g., Allan & Jenkins, 1983), method of presentation (e.g., Wasserman & Shaklee, 1984), type of question asked

(Crocker, 1982), instructions (Peterson, 1980), outcome probability and frequency (e.g., Benassi & Belli, 1987; Jenkins & Ward, 1965; Wasserman & Shaklee, 1984), observer presence (Benassi & Mahler, 1985), scale type (Neunaber & Wasserman, 1986), personal involvement (Harkness, DeBono, & Borgida, 1985), and context (Newman & Benassi, 1989). In addition, the above variables may interact creating a new condition under which decision accuracy fluctuates.

Covariation has been judged accurately when the contingencies are positive (e.g., Alloy & Abramson, 1979), the events exhibit close temporal contiguity (e.g., Catania & Cutts, 1963), outcomes are not affectively valenced (e.g., Alloy & Abramson, 1979), outcomes are associated with success (e.g., Alloy & Abramson, 1979), chance pairings are considered plausible (Peterson, 1980), an appropriate mathematical strategy is employed (e.g., Shaklee, 1983), subjects are personally involved (Harkness, DeBono, & Borgida, 1985), and free-operant tasks are used (Benassi, Knoth, & Mahler, 1985; Wasserman, Chatlosh, & Neunaber, 1983).

The Illusion of Control

Although humans are sensitive to covarying events, they do not always judge accurately (see Alloy & Tabachnik, 1984, for review). People are especially prone to error when contingencies are at or near zero (cf. Alloy & Abramson, 1979; Trolier & Hamilton, 1986). Judging events as related when, in fact, they are not is known as "illusory correlation." When the relation involves act-outcome events, illusory correlation is referred to as the "illusion of control" (Langer, 1975).

Perceiving a relation where none exists is a pervasive tendency and may be observed in many faulty judgment phenomena such as occult belief (Singer & Benassi, 1981), psi phenomena (Benassi, Sweeney, & Drevno, 1979), superstition (Bruner & Revusky, 1961), stereotyping (Hamilton & Rose, 1980), gambling (Kahneman & Tversky, 1973), clinical decision making (Chapman & Chapman, 1967), and implicit personality theory. The covariation judgment literature is replete with examples of illusory correlation (e.g., Alloy & Abramson, 1979; Benassi & Mahler, 1985; Bruner & Revusky, 1961; Catania & Cutts, 1963; Chapman & Chapman, 1967, 1969; Hake & Hyman, 1953; Langer, 1975; Langer & Roth, 1980; Wright, 1962).

Illusory correlation has also been evident in experiments using the bivariate, act-outcome, judgment of control task, JUDCON (Alloy & Abramson, 1979; Jenkins & Ward, 1965). In JUDCON, subjects are asked to learn and judge the degree of control that their actions (e.g., pressing or not pressing a button) exert over the occurrence of an outcome (e.g., a light or a video display). Following twenty to sixty dichotomous act-outcome trials, the judgment of control is made on a zero to 100 point scale with intervals of 5 or 10. The objective correlation of act-outcome relations is calculated according to delta-p; and the accuracy of the judgment may be determined by comparing it to delta-p (Jenkins & Ward, 1965).

When subjects perform noncontingent JUDCON type tasks with high outcome frequency, they often exhibit the illusion of control (cf. Allan & Jenkins, 1980; Alloy & Abramson, 1979). Alloy and Abramson (1979, Exp. 2), for example, reported that nondepressed male ($\underline{M}$ =

30.3) and female ($\underline{M}$ = 51.4) subjects performing JUDCON overestimated control in the 75-75 condition on a 100-point scale (75-75 indicates that delta-p = 0 and that outcomes occurred on approximately 75% of both press and nonpress trials).

Although illusory correlation is pervasive, several JUDCON experiments have discovered that it may be ameliorated under some conditions. Benassi and Mahler (1985), for example, demonstrated that the illusion of control could be reduced in nondepressed subjects if they judged control in the presence of an observer (Benassi & Mahler, 1985). Assuming that an observer's presence induces self-focus, Benassi and Mahler's (1985) results suggest that self-awareness may ameliorate the illusion of control.

III. SELF-AWARENESS AND THE JUDGMENT OF CONTROL

The present research predicts that self-aware subjects will be less likely to exhibit the illusion of control in noncontingent JUDCON problems than would subjects who are not self-aware. Justification for this hypothesis stems from several lines of theory and research.

First, and most generally, self-aware subjects often make judgments that are more accurate and veridical than the judgments of subjects who are not self-aware. Self-awareness increases self-evaluation on cognitive, affective, and behavioral dimensions. Increased self-evaluation is associated with three effects that generally increase judgmental accuracy: a motivation to respond accurately; increased self-knowledge; and the inhibition of self-presentational concerns that sometimes operate at the expense of accurate reporting (Gibbons, 1990).

Second, self-awareness contributes to accurate causal attributions and assessments of responsibility (Cohen, Dowling, Bishop, & Maney, 1985; Ellis & Homes, 1982; Federoff & Harvey, 1976; Gibbons, 1990; Stephenson & Wicklund, 1983). Stephenson and Wicklund (1983), for example, found that self-aware subjects did not overestimate the extent to which behavior produced outcomes. Gibbons (1983; 1990) argued that self-awareness produces a more intense examination of cause and effect relations resulting in the increased accuracy of causal judgments.

Third, the self-aware person is more likely to judge accurately the relation between internal states and behavior. Pryor et al. (1977), for example, observed subjects in actual social situations after gathering self-report data regarding the subjects' social behavior. The results suggested a "veridicality effect"-- reported attitudes in the self-focused condition were more predictive of behavior than were the attitudes reported by externally focused subjects. The veridicality effect indicates that an increase in self-awareness increases the correspondence between internalized standards and self-reports of those standards.

According to the theory of objective self-awareness (Duval & Wicklund, 1972), an internal standard is manifested as an "ideal" standard of correctness. Current social-cognitive theory, however, conceptualizes internal standards as reference values encoded in highly organized cognitive structures such as schemas or prototypes. Knowledge structures develop and are modified through experience (cf. Fiske & Taylor, 1984). Attitudes, expectations, and goals, for example, are expressions of internal standards or reference values.

Duval and Wicklund (1972) assumed that the self perceives causal relations veridically and that standards for judging relations are established with experience. The present research assumes, therefore, that internal standards for control also develop with experience. During a control judgment task, standards for control are evoked and compared to the current perception of control. If self-awareness increases the correspondence between behavior and standards, the veridicality effect suggests that self-awareness should increase the

likelihood of low judgments of control on the noncontingent JUDCON task, thus ameliorating the illusion of control.

The fourth indication that self-awareness might ameliorate illusory correlation stems from studies of depressive realism (Abramson & Alloy, 1981; Alloy & Abramson, 1979, 1988; Mischel, 1979) and the relation between depression and self-focus (Musson & Alloy, 1988). Depressive realism refers to the more accurate and realistic perceptions and inferences often observed in studies of depressed affect (Alloy & Abramson, 1988). Recent literature reviews have articulated numerous behavioral, affective, and cognitive parallels between depression and self-focus (Ingram, 1990; Musson & Alloy, 1988; Smith & Greenberg, 1981). In light of the parallel effects of depression and self-focused attention, the finding that depressives sometimes show less susceptibility to the illusion of control (cf. Alloy & Abramson, 1979) suggests that self-awareness may also ameliorate the correlation bias.

Musson (1988) examined this relation on a noncontingent/win, contingent/lose JUDCON task in which self-awareness was manipulated. Musson (1988) suggested that depressive realism was due to the increased self-focus found in depressives. He hypothesized that nondepressives should become more accurate when self-aware and that depressives should become less accurate when self-awareness was reduced. Neither hypothesis was supported on the noncontingent problem. No differences in mean judgments of control were observed between distracted and nondistracted depressives; and no differences were found between self- and other- focused nondepressives. In

addition, no differences in the judgments of control were found for depressives and nondepressives when both were self-aware. The finding of relevance to the present study, however, is that no difference in control judgments was found between self-focused and other-focused nondepressives.

Although Musson (1988) argued that self-focus reduced the illusion of control, his data support that claim only for distracted depressives and self-focused nondepressives on a contingent, negative outcome problem. Reduced illusion of control is not evident in the noncontingent/win task. The major difficulty with this study, however, is low statistical power. Unfortunately, Musson (1988) was able to recruit only 14 subjects per cell; barely enough to detect even a very large effect (Cohen, 1962; Howell, 1987). If the accuracy effect expected from self-focused is medium to small (Cohen, 1962), at least 50 to 75 subjects will be needed in each cell (Howell, 1987). Fourteen subjects per cell is far to few to detect even a large judgement of control effect in the noncontingent case.

In spite of Musson's (1988) finding that self-aware depressives and nondepressives judged similarly, the relation of self-awareness to depression remains a concern. In the present experiment, judgment effects due to depression are statistically controlled.

The fifth indication that self-awareness should ameliorate the illusion of control stems from two JUDCON studies in which self-focus was either measured or manipulated. In a study of predictors of the illusion of control, Alloy, Abramson, and Musson (1988) examined the effect of dispositional self-consciousness and other variables on the

judgment of control. Low private self-consciousness was one of nine variables that predicted the tendency to succumb to the illusion of control. The implication is that high dispositional self-focus might reduce the illusion of control.

In a study that manipulated self-focus, Benassi and Mahler (1985) examined the effect of a single person audience on judgments of control of depressed and nondepressed subjects. Although the researchers were not examining self-awareness specifically, the theory of objective self-awareness assumes that audience presence evokes self-awareness. Benassi and Mahler (1985; Exp.1) reported that observed nondepressed subjects were less susceptible to illusory correlation than were unobserved nondepressives. Depressed subjects, however, showed the opposite effect becoming less accurate and succumbing to the illusion of control in the self-aware condition. Benassi and Mahler (1985) were unable to account for the interaction between depression and the observer manipulation. Thus, except for the depressives in the later study, both Alloy et al. (1988) and Benassi and Mahler (1985) suggest that the accuracy on JUDCON tasks may be mediated by levels of self-awareness.

The sixth and final indication that self-awareness should ameliorate the illusion of control stems from Duval and Wicklund's (1972) theory of self. They argued that the self is perceived differently depending on the focus of attention. During self-focus, the self appears passive and noncausal, separated from the action complex that produces environmental outcomes. Subjects judging control when self-focused should feel less control and, therefore, be less

susceptible to the illusion of control.

In contrast, an externally focused person is more likely to err in judging control because he or she is operating uncritically in the pursuit of goals and needs. Relatively uncritical goal seeking results in feelings of self-determination and control. The externally focused person is likely to feel in control regardless of the current causal texture (Tolman & Brunswik, 1935) and should, therefore, fall victim to the illusion of control.

In an experiment intended to demonstrate the differential perception of the self that results from self-focus, Duval and Ritz (cited in Duval & Wicklund, 1972) tested the hypothesis that self-aware subjects should judge less control on an ambiguous control task. The task was to judge the extent to which subjects could control the movement of a finger that was tracking a certain spot on a revolving turntable. Results indicated that subjects who performed in the presence of a mirror estimated that they had less control of the movement of their finger than those in a control group.

Duval and Ritz (1971) concluded that the self-aware subjects perceived less control over environmental outcomes because the causal agent self is perceived as having less control over outcomes that result from interactions with the environment. Duval and Wicklund (1972) argued that the feelings of control are eliminated during self-focus because the causal self appears separated or blocked from the action complex that characterizes it. Extending this result to the present study, it is hypothesized that the self-aware person should be less susceptible to the illusory correlation that is often exhibited in

the noncontingent JUDCON problem.

In sum, six lines of evidence suggests that self-aware subjects should be less susceptible to the illusion of control. The present research compares judgments of control and judgments of relation on a bivariate, high outcome, noncontingent, act-outcome task under four different stimulus conditions -- one control condition and three self-focusing stimulus conditions (mirror presence, audience presence, and video camera presence). In addition, the experiment statistically controls for potentially complicating individual differences of dispositional self-consciousness and depressed affect.

IV. THE PRESENT STUDY

The goal of the present research is to determine if self-awareness manipulations, depressed affect, and dispositional self-focus (both public and private) ameliorate the illusion of control. The self-awareness manipulations include audience exposure, mirror exposure, or video camera exposure. The depression indices include the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), and the Multiple Affect Adjective Check List (Zuckerman & Lubin, 1965)). Two measures of dispositional self-focus are the private (PriSC) and public (PubSC) self-consciousness subscales of the self-consciousness Scale (Fenigstein et al., 1975). No differences in judgments of control are expected for subjects judging control in the presence of an audience, a video camera, or an audience. Subjects in these conditions are expected to judge low control more frequently than subjects who are not exposed to self-focusing stimuli.

Dependent Measures

The present study will examine the effects of self-awareness on two direct measures and one derived measure. The direct measures are judgments of control and judgments of relation. The derived measure is the accuracy of control judgments (the judgment of control minus the objective contingency).

Judgments of Control

Judgments of control are made immediately following a JUDCON task by circling a value on a zero to 100 point scale that was graduated in increments of 5. The scale was labeled "no control" on the zero end, "complete control" on the 100 end, and "intermediate control" in the center. Subjects were instructed to "indicate the degreee of control that you believe that your responses (pressing and not pressing the button) had over the appearance of the blue light" (see Appendix C).

Judgments of Relation

After judging control, subjects compieted a questionnaire regarding aspects of the task (Appendix C). Judgments of relation were made by checking "yes" or "no" to the question "do you feel that your responses (pressing or not pressing the button) are related to the outcome (appearance of the blue light)?"

Control Judgment Accuracy

The derived value is a control judgment accuracy index computed by subtracting the empirical delta-p from the judgment of control. This measure indicates the degree to which judgments of control deviated from the actual delta-p exhibited in the task. Whereas judgments of control in each conditon are high or low relative to judgments in another condition, the accuracy index measures the accuracy of control judgments relative to some objective standard.

Predictions

Prediction 1

The primary dependent variable of interest is ratings of control on a zero to 100 point scale. The possible predictors of this judgment are three self-awareness manipulations, depression scores, and self-consciousness scores. It is expected that subjects in the three self-aware conditions will be less susceptible to the illusion of control, i.e., show lower judgments, than those not self-aware. No differences are expected between the self-aware groups. Private, but not public, self-conciousness is also expected to relate to lower judgments. Based on Musson (1988), depression scores are not expected to be related to more accurate judgments.

Prediction 2

The second direct measure of covariation judgment is the dichotomous judgment of relation (yes/no). Because the judgment of relation is conceptually similar to the judgment of control (Benassi & Mahler, 1985), results similar to those obtained on the judgment of control are expected.

Prediction 3

The third dependent variable, a derived accuracy score computed by subtracting the empirical delta-p from the judgment of control, indicates the degree to which judgments of control deviated from the actual delta-p exhibited in the task. The lower the derived value, the greater the accuracy. Controlling for depression and self-

consciousness, it is predicted that values for self-aware subjects will be smaller (more accurate) for subjects in the control condition.

Method

Subjects

385 female subjects enrolled in introductory psychology courses at the University of New Hampshire participated. Females were used to control for variability due to sex (Alloy & Abramson, 1979; Martin, Abramson, & Alloy, 1984). Alloy and Abramson (1979; Exp. 2), for example, observed judgment of control differences between depressed and nondepressed females, but not males. Benassi and Mahler (1985) also used females exclusively. Seventy-five subjects served as observers in an audience condition. 310 subjects were actors randomly assigned to one of four groups. Ten subjects were excluded from the study after failing to follow instructions.

Apparatus

The laboratory consisted of three rooms: a waiting room, an experimental room, and a control room. The experimental room was furnished with a chair and a table on which was centered a light console and a response key. The light console was a 15 x 50 x 5 cm white wooden platform on which was mounted two lights, one yellow and one blue. The yellow light indicated the start of a new trial and the blue light signaled the occurrence of an outcome. A telegraph response key was placed next to the console. In the control room, two probability generators and related switching circuitry were set to

produce outputs (blue lights) on 75% of the trials. One generator was activated when a subject pressed a response key within a 3 s critical time limit and the other was activated when a subject failed to push the response key within a 3 s critical time limit.

Procedure

After entering the waiting room, subjects completed the Self-Consciousness Scale (Fenigstein et al., 1975), the Beck Depression Inventory (Beck et al., 1961), and the Multiple Affect Adjective Checklist (Zuckerman & Lubin, 1965). Subjects were then assigned to one of three experimental groups or a control group. The experimental conditions included a mirror condition (N=75), a camera condition (N=75), and an audience condition (N=75), and a control condition (N=75). After being assigned a condition, subjects entered the experimental room and sat at the table on which was placed the light console and the response key.

In the mirror condition, a large mirror (18 x 28 in.) was strategically placed opposite the subject so that, as she sat at the experimental table, the subject's face and upper torso was maintained in her view. The presence of the mirror was not mentioned by the experimenter.

In the camera condition, a video camera placed five feet from the console was directed to the right front of the subject. The camera was directed away from the subject during the reading of the instructions. As the experimenter left the room, the camera was directed toward the subject. The experimenter commented that "today was camera day" and

departed.

In the audience condition, a second subject entered the room with the experimental subject and sat in a chair to the right and rear of the subject with the console in full view. The observer was instructed in the same manner as the actor, except that she was to judge the extent of the actor's control; i.e., the observer listened to the instructions, and judged control, but she performed as a silent observer, not an actor).

In all conditions, after the subjects were seated, the experimenter recited the following set of instructions to the subject:

> In this problem-solving experiment, it is your task to learn what degree of control you have over whether or not this blue light goes on. There are three important features of the task: the yellow light, the key press response key, and the blue light.
>
> Each time that the yellow light goes on indicates the start of a new trial. For each trial, after the yellow light goes on, you have the option of either making a key press response or not making a key press response. A key press response consists of pressing this key once and only once immediately after the yellow light goes on. Not making a key press response consists of doing nothing when the yellow light goes on. If you intend to press the response key on a given trial, you must press within two seconds after the yellow light goes on; otherwise, the response to the trial will be counted as a "no press" response.
>
> Let me summarize what I have said so far. Your task is to learn what degree of control that your responses have over whether or not the blue light comes on. At the start of each new trial the yellow light will go on for two seconds. After the yellow light goes off, the blue light will either go on or it will not go on. There will then be a short pause and then the yellow light will start a new trial. Do you understand the instructions so far?
>
> You may find that the blue light will light on some percentage of the trials on which you make a key press response. You may also find that the blue light will light on some percentage of the trials on which you do not make a key press response. Since it is your job to learn how much control you have over whether the blue light goes on, it is to your advantage to press on some trials and not to press on others. That way you will know what happens when

you don't press as well as when you do press. For example, if you decided to press on every trial, you may find that the blue light goes on some trials. However, because you never withheld from pressing the response key, you do not know how often the blue light would have lit on these "no press" trials. In order to learn how much control your responses have over whether the blue light goes on, you must observe what happens when you press and when you do not press. Do you understand the instructions so far?

Forty trials will constitute the problem. After the 40 trials are completed, I am going to ask you several questions about how much control you had over the occurrence of the blue light. Complete control means that the onset of the blue light on any given trial is determined by your choice of responses, either pressing or not pressing the response key. In other words, complete control is when, on a given trial, the lighting or not lighting of the blue light is totally determined by either your pressing the response key or by your just sitting back an not pressing. No control means that you have found no way to make response choices so as to influence in any way the onset of the blue light. In other words, the onset of the blue light has nothing to do with whether or not you press the response key. Intermediate control means that your choice of responses influences the onset of the blue light even though it does not completely determine whether or not the blue light goes on. In other words, what you do or don't do matters to some extent but not totally. Another way to look at having intermediate control is that one response, either pressing or not pressing the response key, produces blue light onset more often than does the other response. It may turn out that will have no control over the blue light onset, or it may turn out that will have some degree of control, either complete or intermediate. Any questions?

All Subjects were exposed to 40 3-second trials with an intertrial interval of 5 s. The yellow light signaled the start of each trial at which time the subject chose to press or not to press the response key. At the end of 3 seconds, the blue light would light or not light according to the outcome probabilities for pressing or not pressing the response key.

Upon completion of the 40 trials, subjects estimated control by circling a value on a 0 to 100 Judgment of control scale that was graduated in increments of 5 and was labeled "no control" on the zero end, "complete control" on the 100 end, and "intermediate control" in the center (Appendix C). Finally, subjects completed a questionnaire (Appendix C) which requested estimations of the frequency of conjoint events, a judgment of relation between responses and outcomes, and open ended evaluations regarding the relation between pressing the response key and the lighting of the blue light. Subjects were then debriefed (without informing them of the actual degree of control), thanked, and dismissed.

Results

Preliminary analyses--Task events

To ensure that task related events did not differ across conditions, analyses of variance (ANOVA) examined mean differences in the observed value of delta-p (delta-p), the frequency of presses (Press), and outcome frequency (Outcome). No differences were expected across experimental conditions. Table 1 lists means, standard deviations, and F values with associated probabilites for the event variables. Mean values for the event variables did not reliably differ across conditions.

Premliminary analyses--Mood and personality measures

To ensure that mood and personality measures did not differ across conditions, ANOVA examined mean differences in the BDI (Beck et al., 1961) and the MAACL (Zuckerman & Lubin, 1967), and the private and public self-consciousness subscales of the self-consciousness scale (Fenigstein et al., 1975). No reliable differences in mean values were expected and none were observed. Table 2 lists means, standard deviations, and F values with associated probabilities. Values for mood and self-consciousness are consistent with those found elsewhere (cf. Fenigstien et al., 1975). Table 3 presents scale reliability values (Cronbach alphas) and correlations between the mood scales and the private and public self-consciousness subscales. Correlation coefficents are similar to those found elsewhere (cf. Smith & Greenberg, 1981).

Prediction 1

The primary dependent variable of interest is judgments of control made on a zero to 100 point scale, graduated in increments of five. Self-awareness manipulations, depression scores, and self-consciousness scores are possible predictors of this judgment. It is expected that self-aware subjects will be less susceptible to illusory correlation, i.e., show more accurate judgments, than those not self-aware.

Figure 1 depicts distributions of control judgments both overall and by condition revealing that judgments of control in the noncontingent case form a J-shaped distribution. The J-shape of the distributions renders interpretations of low control in terms of

central tendencies questionable. An alternative approach that suggests a more meaningful interpretation classifies judgments as either low or not low according to a judgment criterion. In the present study, ratings on the judgment of control scale are classified as low or not low according to several criteria (e.g., a criterion of 20 means that all judgments less than 20 are classified as low; judgments of 20 and greater are considered not low). The frequecy of low judgments of control for any self-awareness condition is evaluated across criteria by comparing the probabilities in that condition to those in other experimental conditions or to a control condition.

Table 4 lists the frequency and probability of low judgments for all conditions across various criteria. The probability of judging low control is greater in the self-aware conditions than in the environmental-focus condition across criteria. In addition, the probability of judging low control is similar for the self-awareness conditions. Figure 2 shows the log odds of judging low control in each condition as a function of various criteria. The log odds of judging low control are greater for subjects in the self-aware conditions across all criteria.

Although any criterion might be selected for examining the effect of self-awareness conditions, the criterion of 10 is chosen for further analysis because judgments less than 10 reflect very low judgments; and because the effect of self-awareness manipulations shown in Figure 2 is greatest when the standard for low judgments is less than 10.

In order to determine the relative contribution of the independent variables to the probability of making low judgments, a logit regression was conducted on the dichotomized judgment of control. Logit regression uses maximum likelihood methods to fit coefficents that may be interpreted in terms of odds, the probability of an event occuring divided by the probability of an event not occuring (Hosmer & Lemeshow, 1989). In the present study, logit regression estimates parameters that maximize the log of the likelihood ratio of low judgments as a function of the independent variables. Regression coefficients are interpeted in terms of the log odds ratio of each self-aware conditions to the control condition.

Table 5 lists parameter estimates from logit regressions of judgments of control on experimental conditions, depression, and public and private self-consciousness. The full model is listed in the left column with coefficients and standard errors for all variables. The fit of the full model is given by $\chi^2(6) = 11.4$, $p = .077$. The coefficients for the self-consciousness and depression variables in the full model do not differ from zero. By including in the model only the experimental conditions (whose regression coefficents differ significantly from zero), a reduced model is obtained whose fit improves, $\chi^2(3) = 8.87$, $p = .031$. The central two columns in Table 5 list the regression coeffients and standard errors for variables that differ significantly from zero.

Table 5 shows that the self-awareness conditions significantly increased the odds of a low judgment. The effect of each condition is given in the far right column of Table 5 as Exp(B). Exp(B) is the

exponential coefficient (e = 2.718) raised to the power of the regression coefficient, B. For each self-awareness condition, Exp(B) is the maximum likelihood estimate of the odds ratio. Exp (B) indicates that the predicted odds of judging low increased by a factor of 2.74 for the observer condition, by 2.74 for the camera condition, and by 2.57 for the mirror condition. For example, the odds of judging low control (5 or below) in the observer condition is 24/51 = .47 compared to the odds of judging low in the control condition, 11/64 = .17 (see Table 4). The odds of obtaining low judgments in the observer condition is 2.74 times greater than obtaining low judgments in the control condition (2.74 x .17 = .47). The coefficients for the independent variables depression and private and public self-consciousness did not differ significantly from zero, thus showing no predictive utility.

Prediction 2

The second dependent variable is the dichotomous judgment of relation (yes/no). The variable is conceptually similar to the judgment of control and effects similar to those seen on the judgment of control variable are expected. Self-awareness manipulations, depression scores, and self-consciousness scores are again possible predictors of control judgment. Self-aware subjects should be less susceptible to illusory correlation, i.e., they should show judge "no relation" more frequently than those not self-aware.

Table 6 shows the frequency and probability of judging "no relation" as a function of condition. The probability of judging accurately is greater in all self-awareness conditions compared to the control condition. Although subjects in the mirror condition were more accurate than those in the control group, they were less accurate than subjects in the observer and camera conditions. Figure 3 shows the log odds of making "no relation" judgments as a function of experimental condition.

A logit regression was used to determine the relative contributions of the independent variables to the likelihood of making "no relation" judgments. Table 7 lists parameter estimates from logit regressions of judgments of relation on experimental conditions, depression, and public and private self-consciousness. The full model is listed in the left column giving coefficients and standard errors for all variables. Although the full model fits well, $\chi^2 = 21.49$, $p = .002$, several coefficients do not differ from zero. By eliminating variables whose coefficients do not differ significantly from zero, a more parsimonious reduced model is obtained, $\chi^2 = 15.03$, $p = .002$. The coefficents and error terms in the reduced model are listed in the central columns of Table 7. Two of the three experimental coefficents, observer and camera, differ significantly from zero. Although the mirror condition does not reach significance, the probability of obtaining a coefficent of that value is low, $p < .10$. The effect of each condition on the predicted odds is given in the right column of Table 7 as Exp(B). Exp (B) indicates that the predicted odds of judging "no" relation increased by a factor of 3.42 for the observer condition, by 3.14 for the camera condition, and by 1.77 for the mirror

condition. As with the judgment of control variable, depression and self-consciousness showed little predictive utility.

Prediction 3

The third dependent variable is a derived accuracy score computed by subtracting the empirical delta-p from the judgment of control. This measure indicates the degree to which judgments of control deviated from the actual delta-p exhibited in the task. The closer that value is to zero, the greater the accuracy. It is predicted that values for self-aware subjects will be closer to zero (more accurate) than those in the control condition. Table 8 lists means and standard deviations of accuracy scores by condition. Deviations from delta-p are closer to zero in all three self-awareness conditions.

An ordinary least squares regression of control judgment accuracy was conducted on self-awareness conditions. Depression, and public and private were omitted from the analysis after failing to show effects on the primary dependent variables. Table 9 reveals significant coefficents for the mirror and observer condition. The coefficient for the camera condition was not significant although mean scores were in the expected direction.

Summary

Table 10 summarizes the effect of the independent variables on each dependent variable. For the dichotomized judgment of control variable, self-awareness manipulations significantly contributed to lower control judgments. Mood and self-consciousness showed no effect.

A similar pattern was shown for judgments of relation. Although the subjects in the mirror condition judged no relation more frequently, the difference was not significant. for the the third dependent variable, control judgment accuracy was reliably increased in the observer and mirror conditions. Although judgments in the camera condition were in the expected direction, the regression coefficient did not reliably differ from zero.

V. DISCUSSION

The present research examined the effect of self-awareness on judgments of control in a bivariate, noncontingent, act-outcome task. It was predicted that subjects judging control in the presence of self-focusing stimuli would become less susceptible to the illusion of control.

The results of this experiment demonstrate that self-awareness ameliorates the illusion of control. The odds of judging low control increased significantly when subjects performed in any of the three self-focus conditions. The odds of judging no relation increased significantly for the observer and camera conditions, and increased, although not significantly, for the mirror conditions. Subjects in all three self-awareness conditions judged control more accurately relative to the objective correlation of act-outcome events. Throughout the analyses, the observer condition consistently showed the strongest effects.

These findings are consistent with research that has examined the effects of self-focused attention on judgment. This research has shown that self-focused attention increases the accuracy of judgments of causality and responsibility, increases attitude-behavior consistency, increases internal state awareness, and increases the veridicality of self-reports (see Gibbons, 1990, for a review). The present findings are also consistent with predictions made by self-awareness theory regarding the causal agent self and the self-evaluation process.

The Causal Agent Self and the Illusion of Control

There is general agreement among social scientists that people are motivated to control environmental events (Adler, 1930; de Charms, 1968; Hendrick, 1943; Langer, 1975; White, 1959). The motivation to control has been regarded as adaptive in the sense that the experience of control is often associated with increased activity and positive mood (Alloy & Tabacknik, 1984; Langer, 1975; Skinner, 1985). Duval and Wicklund (1972), for example, characterized the self as an action complex or causal agent self that is associated with feelings of action and causal effectiveness. Langer (1975) contended that the illusion of control occurs when people feel confident in their ability to control outcomes, even in chance settings.

The assumption that people generally experience feelings of control is problematic for self-awareness theory because it suggests contradictory hypotheses regarding the illusion of control. Research examining the effect of self-focus on internal state awareness has demonstrated that self-focus increases the intensity of emotional exeriences and increases veridical reporting of internal states (Reisenzein & Gattinger, 1982; Scheier, 1976; Scheier & Carver, 1977; Scheier, Carver, & Gibbons, 1979). If self-focus increases awareness of feelings of control, then it follows that self-awareness should exacerbate, not ameliorate, the illusion of control.

Duval and Wicklund (1972) argued, however, that the perception of the self as a causal agent changes during self-focus. Whereas the self-perception of an environmentally-focused person is characterized by feelings of action and control, the aware self is perceived as

passive and noncausal. Self-aware subjects, therefore, should feel more passive and should experience less control. This component of the theory predicts that self-focus should ameliorate illusory correlation when judging act-outcome relations.

The finding of the present research that self-awareness ameliorates illusory correlation suggests that feelings of control may actually decrease during self-focus. When it is the object of attention, the self appears separated from the action complex that characterizes it. The experience of less control is thus reflected in judgments of control.

The Self-evaluation Component and the Illusion of Control

The self-evaluation component of the theory of objective self-awareness suggests that self-focus reduces judgment error by increasing or intensifying self-evaluation on cognitive, affective, and behavioral dimensions (Gibbons, 1990). When self-evaluation intensifies, access to internal standards increases as does the frequency of comparisons of current perceptions to internalized standards. Attempts to maintain consistency between behavior and internal standards result in accurate judgments. The present research assumes that this matching-to-standard process contributes to the effects in the present study as well.

The first difficulty with this reasoning is determining what would constitute the relatively veridical internal standard for a judgment of control or a judgment of relation. There are at least two possibilites. The first possibility is that veridical standards of

control are established with experience and those standards are evoked for comparison during self-awareness.

Duval and Wicklund (1972) claimed that the "ideal" self, or standard of correctness, is established on any salient self-dimension through interaction with the environment. Using this reasoning, standards for control should be idealized during experiences with act-outcome events. Carver and Scheier (1981) argued that standards of all types are maintained as part of a hierachical network of cognitive schema. Powers (1973) reserved an entire level of his standards hierarchy for standards of relations. This network involves causal schema-- cognitive structures that organize and interpret causal patterns and produce behavior (Brehmer, 1974; Fenigstein & Levine, 1987; Heider, 1958; Kelley, 1967). Tversky and Kahneman (1980) argued that a critical element in the perception of cause and effect data is the role that those data play in a causal schema. It seems highly probable, therefore, that relatively veridical representations of act-outcome events that develop with experience are available as standards of comparison for the judgment of control task.

A second possibility is that standards for judgment were established in the first few trials of the experiment in the form of hypotheses regarding the pattern of act-outcome events. Castellan and Edgell's (1973) hypothesis generation model for multiple-cue probability judgments assumed that subjects generate and test hypothesis regarding cue-outcome patterns. Brehmer (1974) proposed that subjects learning a cue-probability task maintain a hierarchy of hypotheses regarding relations between variables, and that they sample

hypotheses regarding relations during the task.

In a JUDCON task, subjects could form hypotheses of control based on empirical act-outcome patterns and could test those hypotheses by a matching-to-standard process. Successful matches suggest control over the events. According to the theory of self-awareness, self-focused subjects would be more accurate for two reasons. First, when a subject is self-aware, hypotheses (standards) are encoded and accessed in terms of the self; i.e., hypotheses are self-referenced. Self-aware subjects, therefore, have greater access to hypotheses in memory. Second, the frequency and thoroughness of hypothesis tests or comparisons increase when subjects are self-aware (Carver & Scheier, 1981).

The present research, however, provides no direct evidence for the nature of the control judgment standard. In fact, there is no evidence that any standard for comparison was accessed or that such a standard even exists. All that has been demonstrated in the present study is a reduction in judgment bias. It is premature, therefore, to posit a particular judgment process based on the results of the present study.

The self-evaluation component also suggests that self-awareness does not only produce lower judgments, but actually increases "accuracy" in judgment (assuming an extant veridical standard). In the present study, however, reductions in the illusion of control cannot be attributed to accuracy as previouly defined. In the noncontingent case, lower judgments are also more accurate with respect to the objective delta-p. If subjects are judging lower, they only appear to be more accurate with respect to a low delta-p. Thus, claims of

accuracy resulting from self-awareness manipulations in the noncontingent case are premature.

Self-awareness Manipulations versus Dispositional Self-focus

Although the three self-awareness manipulations exerted similar effects on control judgments, measures of dispositional self-focus proved irrelevant. It was not surprising that effects were not found as a function of public self-consciousness. As was mentioned earlier, there is some doubt that public self-focus measures self-awareness (Wicklund & Gollwitzer, 1987).

It was surprising, however, that private self-consciousness also failed to predict judgment accuracy. Alloy, Abramson, and Musson (1988) found that low private self-consciouness predicted illusory correlation implying that high private self-consciousness would predict reductions in illusory correlation. This notion is not supported in the present study.

The present results lend credence to Wicklund and Gollwitzer's (1987) critcisms regarding the inappropriateness of explaining a set of reactions by categorizing subjects as high or low in self-consciousness (subjects in the present research were not categorized as high or low in self-consciousness; instead, private self-consciousness was treated as a continuous independent variable). Wicklund and Gollwitzer (1987) reasoned that categorizing subjects in terms of their self-consciousness level prevents new insights into the functioning of the self-awareness. It is important to note, therefore, that the effect of self-focus on judgments of control is unique to manipulated

self-focus; that is, no reductions in the illusion of control due to private self-consciousness were evident.

Self-awareness and Depression

The purpose of including a depression variable in the model was to control statistically for depressive symptoms. Research has demonstrated that mood affects judgments of control, sometimes in rather unexpected ways (cf. Benassi & Mahler, 1985). Depression was removed from both logit regression models, however, when it failed to predict accurate judgments. Thus, the present study supports Musson's (1988) conclusion that judgement of control differences between depressed and nondepressed subjects are not found under conditions of self-awareness.

In his investigation of the role of self-focus in depressive realism, Musson (1988) concluded that self-focused attention is a mediator of both the illusion of control and depressive realism. However, Musson (1988) failed to find reductions in the illusion of control for nondepressed subjects in the noncontingent/win problem. Several factors have contributed to this nonfinding. First, as the present study indicates, the reductions in the illusion of control constitute a relatively small effect requiring fairly large sample sizes to detect it. Whereas Musson (1988) averaged on 14 subjects per cell, the current study used 75 subjects in each condition. Second, Figure 1 reveals how the distribution of judgments of control in the noncontingent case is J-shaped, rendering interpretations in terms of central tendencies questionable. Musson (1988) used standard analyses

of variance to examine differences in mean values. It seems unlikely that the small cell size was adequate to overcome the violation of the assumption of normality. Finally, Musson (1988) used only a mirror condition to study self-awareness. Results from the present study indicate, however, that the mirror was the weaker of the three conditions. In sum, the above analysis suggests that future studies use an adequate sample size, an appropriate analysis of the data, and multiple sources of self-focusing stimuli.

Directions for Further Research

The present research indicates that people judge less control in the noncontingent condition when they are self-aware. Future research may investigate the effect of self-awareness on judgments of contingent control as well. Because it is possible that self-aware subjects simply judged lower control in the current problem rather than judging more accurately, research has not yet determined if people judge more accurately across a range of contingencies.

Another avenue of research might examine the assumption that people maintain standards of control. If standards do exist, can they be characterized or determined? A control protocol procedure might be employed, for example, in which subjects generate paper and pencil scenarios regarding some hypothesized control relation. These protocols might feature a series of discreet act-outcome events that are similar to act-outcome events that occur in the subject's environment. After subjects creates several series of act-outcome trials (representing various degrees of control over outcomes),

objective delta-ps can be calculated and compared to the hypothesized control relation. The assumption is that internal representations of control may be mapped by written control scenarios.

Research has demonstrated the effects of self-awareness on at least three cognitive biases: the fundamental attribution error (Reisenzein & Gattinger, 1982), the self-serving bias (Pryor et al., 1977), and the illusion of control. In each case, the bias was ameliorated by self-focus. Future research might continue to examine the effect of self-awareness on cognitive heuristics and biases, such as availability and representativeness heuristic, or the self-serving bias. These heuristics and biases often result from the inappropriate use of data, or from making inferences by going beyond the data given (Markus & Zajonc, 1985). Self-awareness research suggests that the tendency to go beyond the data may be reduced due to the increased motivation for consistency between standards and behavior that is evident during self-focus.

Summary

The present research predicted that self-aware female subjects would show less susceptibility to the illusion of control than subjects who were not self-aware. This hypothesis was confirmed for three self-awareness manipulations, but not for individual differences in private or public self-consciousness. Consistent with the judgment of control finding, subjects also judged "no relation" between actions and outcomes more frequently when self-aware (differences in the mirror condition were in the predicted direction, but were nonsignificant).

As with judgments of control, judgments of no relation were not accounted for by individual differences in self-consciousness. Finally, differences in control judgment accuracy scores were accounted for in two of the three self-awareness conditions.

The causal agent self and self-evaluation components of self-awareness theory provide plausible accounts for the the present results. The causal agent self component suggests that people judge less control because perceptions of the causal agent self change under self-awareness conditions. To the self-aware subject, the self appears passive, noncaual, and reflective; i.e., the self is perceived as having less control. In this case, reductions in the illusion of control result from lower, but not necessarily more accurate, judgments.

The self-evaluation component suggests that people judge low control more frequently because self-focus stimulates the self-evaluation process by increasing the frequency and thoroughness of a matching-to-standard process whereby veridical standards of control are matched to current perceptions. In this case, a lower judgment might also be considered an accurate judgment because it resulted from a comparison of current perceptions to some veridical standard of control. The present research, however, is unable to determine if subjects were simply judging lower under self-awareness conditions, or if they were actually making more accurate judgments. Such determinations remain for future research.

Previous research examing control judgments has stressed the adaptive significance of perceiving oneself in control of environmental outcomes (cf. Abramson & Alloy, 1980; Langer, 1975). If perceived control is assumed to be adaptive, then the present research suggests that excessive self-awareness may be, in some sense, maladaptive (Ingram, 1990; Smith & Greenberg, 1981; Musson & Alloy, 1988). The results of the present experiment, therefore, suggest the importance of the relation between self-awareness and adaptive behavior. Future reseach investigating the relation between self-awareness and perceptions of causality and control is expected to contribute to the scientific understanding of both adaptive and maladaptive human behavior.

LIST OF REFERENCES

Abramson, L.Y., & Alloy, L.B. (1980). Judgments of contingency: Errors and their implications. In A. Baum & Singer (Eds). Advances in Experimental Psychology (Vol. 2). Hillsdale, NJ:Erlbaum.

Abramson, L.Y., & Alloy, L.B. (1981). Depression, nondepression, and cognitive illusions: A reply to Schwartz. Journal of Experimental Psychology: General, 110, 436-447.

Adler, A. (1930). Individual psychology. In C. Murchinson (Ed.), Psychologies of 1930. Worcester, MA: Clark University Press.

Allan, L.G. (1980). A note on measurement of contingency between two binary variables in judgment tasks. Bulletin of the Psychonomic Society, 15, 147-149.

Allan, L.G., & Jenkins, H.M. (1980). The judgment of contingency and the nature of the response alternative. Canadian Journal of Psychology, 34, 1-11.

Allan, L.G., & Jenkins, H.M. (1983). The effect of representations of binary variables on judgment of influence. Learning and Motivation, 14, 381-405.

Alloy, L.B., & Abramson, L.Y. (1979). Judgment of contingency in depressed and nondepressed students: Sadder but wiser? Journal of Experimental Psychology:General, 108, 441-485.

Alloy, L.B., & Abramson, L.Y. (1988). Depressive realism. In Alloy, L.B. (Ed.), Cognitive Processes in Depression. New York: Guilford.

Alloy, L.B., Abramson, L.Y., & Musson, R.F. (1987). Who distorts?:Predictors of the illusion of control. Unpublished manuscript cited in Alloy, L.B. (Ed.), Cognitive Processes in Depression. New York: Guilford.

Alloy, L.B., Abramson, L.Y., & Viscusi, D. (1981). Induced mood and the illusion of control. Journal of Personality and Social Psychology, 41, 1129-1140.

Alloy, L.B., & Tabachnik, N. (1984). Assessment of covariation by humans and animals: The joint influence of prior expectations and current situational information. Psychological Review, 91, 112- 149.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. Archives of General Psychiatry, 4, 53-63.

Benassi, V.A., & Belli, R.F. (1987). Judgment of control: The elusive outcome frequency effect. Unpublished manuscript. University of New Hamphsire, Durham, New Hampshire.

Benassi, V.A., Knoth, R., & Mahler, H.I.M. (1985). Detection of noncontingency in a free-operant situation. Personality and Social Psychological Bulletin, 11, 231-245.

Benassi, V.A., & Mahler, H.I.M. (1985). Contingency judgments by depressed college students: Sadder but not always wiser? Journal of Personality and Social Psycholgoy, 49, 1323-1329.

Benassi, V.A., Sweeney, P.D., & Drevno, G.E. (1979). Mind over matter: Perceived success at psychokinesis. Journal of Personality and Social Psychology, 37, 1377-1386.

Brehmer, B. (1974). Hypotheses about relations between scaled variables in the learning of probabilistic inference tasks. Organizational Behavior and Human Performance, 11, 1-27.

Briggs, S.R., Cheek, J.M., & Buss, A.H. (1980). An analysis of the self-monitoring scale. Journal of Personality and Social Psychology, 38, 679-686.

Broadbent, D.E. (1958). Perception and communication. New York: Pergamon.

Bruner, A., & Revusky, S.H. (1961). Collateral behavior in humans. Journal of the Experimental Analysis of Behavior, 4, 349-350.

Carver, C.S., Blaney, P.H., & Scheier, M.F. (1979). Focus of attention, chronic expectency, and response to a feared stimulus. Journal of Personality and Social Psychology, 37, 1186-1195.

Carver, C.S., & Scheier, M.F. (1978). Self-focusing effects of dispositional self-consciouness, mirror presence, and audience presence. Journal of Personality and Social Psychology, 36, 324-332.

Carver, C.S., & Scheier, M.F. (1981). Attention and self-regulation: A control-theory approach to human behavior. New York: Springer-Verlag.

Carver, C.S., & Scheier, M.F. (1987). The blind man and the elephant: Selective examination of the public-private literature gives rise to faulty perception. Journal of Personality, 55, 525-541.

Carver, C.S., & Scheier, M.F. (1990). Origins and functions of positive and negative affect: A Control-Process view. Psychological Review, 97, 19-35.

Castellan, N.J., & Edgell, S.E. (1973). An hypothesis generation model for judgment in nonmetric multiple-cue probability learning. Journal of Mathematical Psychology, 10, 204-222.

Catania, A.C., & Cutts, D. (1963). Experimental control of superstitious responding in humans. Journal of the Experimental Analysis of Behavior, 6, 203-208.

Chapman, L.J., & Chapman, J.P. (1967). Genesis of popular but erroneous psychodiagnostic observations. Journal of Abnormal Psychology, 72, 193-204.

Chapman, L.J., & Chapman, J.P. (1969). Illusory correlation as an obstacle to the use of valid diagnostic signs. Journal of Abnormal Psychology, 74, 271-280.

Cohen, J. (1977). Statistical power for the behavioral sciences. (Rev. ed.). New York: Academic Press.

Cohen, J.L., Dowling, N., Bishop, B., & Maney, W. (1985). Causal attributions: Effects of self-focused attention and self-esteem feedback. Personality and Social Pscyhology Bulletin, 11, 369- 378.

Cooley, C.H. (1902/1964). Human nature and the social order. New York: Scribners.

Cottrell, N.B. (1968). Performance in the presence of other human beings. In E.C. Simmel, R.A. Hoppe, & G.A. Milton (Eds.), Social facilitation and imitative behavior (pp. 91-110). Boston, MA:Allyn and Bacon.

Crocker, J. (1982). Biased questions in judgment of covariation studies. Personality and Social Psychology Bulletin. 8, 214-220.

Davis, D., & Brock, T.C. (1975). Use of first person pronouns as a function of increased objective self-awareness and prior feedback. Journal of Experimental Social Psychology, 11, 381-388.

de Charms, R. (1968). Personal causation. New York:Academic Press.

Duval, S. (1971). Causal attribution as a function of focus of attention. Unpublished manuscript, University of Texas, Austin.

Duval, S. (1976). Conformity on a visual task as a fucntion of personal novelty on attitudinal dimensions and being reminded of the object status of self. Journal of Experimental Social Psychology, 12, 87-98.

Duval, S., & Wicklund, R.A. (1972). A theory of objective self-awareness. New York: Academic Press.

Duval, S., & Wicklund, R.A. (1973). Effects of objective self-awareness on attribution of causality. Journal of Experimental Social Psychology, 9, 17-31.

Edelmann, R.J. (1985) Individual-differences in embarrassment, self-consciousness, self-monitoring, and embarrassability. Personality and Individual Differences, 6, 223-230.

Ellis, R.J., & Holmes, J.G. (1982). Focus of attention and self-evaluation in social interaction. Journal of Personality and Social Psychology, 43, 67-77.

Federoff, N.A., & Harvey, J.H. (1976). Focus of attention, self-esteem, and the attribution of causality. Journal of Research in Personality, 10, 336-345.

Fenigstein, A. (1987). On the nature of private and public self-consciousness. Journal of Personality, 55, 543-554.

Fenigstein, A., & Levine, M.P. (1987). Self-attention, concept activation, and the causal self. Journal of Experimental Social Psychology, 20, 231-245.

Fenigstein, A., Scheier, C.S., & Buss, A.H. (1975). Public and private self-consciousness: Assessment and theory. Journal of Consulting and Clinical Psychology, 43, 522-527.

Fiske, S.T., & Taylor, S.E. (1984). Social Cognition. Reading, MA:Addison-Wesley.

Franzoi, S.L., & Sweeney, P.D. (1986). Another look at the relation between private self-consciousness and self-attribution. Journal of Research in Personality, 20, 187-206.

Froming, W.J., Walker, G.R., & Lopyan, K.J. (1982). Public and private self-awareness: When personal attitudes conflict with societal expectations. Journal of Experimental Social Psychology, 18, 476-487.

Gibbons, F.X. (1978). Sexual standards and reactions to pornography: Enhancing behavioural consistency through self-focused attention. Journal of Personality and Social Psychology, 36, 976-987.

Gibbons, F.X. (1983). Self-focused attention and self-report validity: The "veridicality" hypothesis. Journal of Personality, 51, 517- 542.

Gibbons, F.X. (1990). Self-attention and behavior: A review and theoretical update. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 23). New York: Academic Press.

Gibbons, F.X., & Gaeddert, W.P. (1984). Focus of attention and placebo utility. Journal of Experimental Social Psychology, 20, 159-176.

Gibbons, F.X., & Wright, R.A. (1983). Self-focused attention and reactions to conflicting standards. Journal of Research in Personality, 17, 263-273.

Greenberg, J., & Musham, C. (1981). Avoiding and seeking self-focused attention. Journal of Reserach in Personality, 15, 191-200.

Harkness, A.R., DeBono, K.G., & Borgida, E. (1985). Personal involvement and strategies for making contingency judgments-- A state in the dating game makes a difference. Journal of Personality and Social Psychology, 49, 22-32.

Henchy, T., & Glass, D.C. (1968). Evaluation apprehension and the

social facilitation of dominant and subordinate responses. Journal of Personality and Social Psychology, 10, 446-454.

Heider, F. (1958). The psychology of interpersonal relations. New York: Wiley

Hendrik, I. (1943). The discussion of the "Instinct to Master." Psychoanalytic Quarterly, 12, 561-565.

Hosmer, D.W., & Lemeshow, S. (1989). Applied logistic regression. New York: John Wiley & Sons.

Hormuth, S.E. (1982). Self-awareness and drive theory: Comparing internal standards and dominant responses. European Journal of Social Psychology, 12, 31-45.

Howell, D.C. (1987). Statistical methods for psychology. (2nd ed.). Boston:Duxbury Press.

Hull, J.G., & Levy, A.S. (1979). The organizational functions of the self: An alternative to the Duval and Wicklund Model of self-awareness. Journal of Personality and Social Psychology, 37, 756-768.

Ingram, R. (1990). Self-focused attention in clinical disorders: Review and Conceptual Model. Psychological Bulletin, 107, 156-176.

Inhelder, B., & Piaget, J. (1958). The growth of logical thinking from childhood to adolescence. New York:Basic.

James, W. (1890). The principles of psychology. New York: Holt.

Jenkins, H.M., & Ward, W.C. (1965). Judgment of contingency between responses and outcomes. Psychological Monographs, 79, (1, Whole No. 594).

Jennings, D.L., Amabile, T., & Ross, L. (1980). Informal covariation assessment: Data-based versus theroy-based judgments. In D. Kahneman, P. Slovic, & A. Tversky (Eds.), Judgement under uncertainty: Heuristics and biases. Cambridge, England: Cambridge University Press.

Kelley, H.H. (1967). Attribution theory in social psychology. In D. Levine (Ed.), Nebraska symposium on motivation (Vol. 15). Lincoln:University of Nebraska Press.

Kihlstrom, J.F., Cantor, N., Abright, J.S., Chew, B.R., Klein, S.B., & Niedenthal, P.M. (1988). Information processing and the study of the self. In L. Berkowitz (Ed.) Advances in experimental social psychology (Vol. 21). New York: Academic Press.

Langer, E.J. (1975). The illusion of control. Journal of Personality and Social Psychology, 32, 311-328.

Leary, M.R. (1983). Social anxiousness: The construct and its measurement. Journal of Personality Assessment, 47, 66-75.

Lepper, M.R., Zanna, M.P., & Abelson, R. (1970). Cognitive irreversibility in a dissonance reduction situation. Journal of Personality and Social Psychology, 16, 191-198.

Markus, H., & Wurf, E. (1987). The dynamic self-concept: A social psychological perspective. In M.R. Rosenzweig & L.W. Porter (Eds.), Annual review of psychology (Vol. 38). Palo Alto, CA: Annual Reviews.

Markus, H., & Zajonc, R.B. (1985). The cognitive perspective in social psychology. In G. Lindzey & E. Aronson (Eds.), Handbook of socal psychology: Vol. 1. Theory and method (3rd ed., pp. 137-230). New York: Random House.

Martin, D., Abramson, L.Y., & Alloy, L.B. (1984). The illusion of control for self and others in depressed and nondepressed college students. Journal of Personality and Social Psychology, 46, 125-136.

Meade, G.H. (1934). Mind, self, and society. Chicago: University of Chicago Press.

Michotte, A. (1963). The perception of causality. New York:Basic Books.

Mischel, W. (1979). On the interface of cognition and personality: Beyond the person-situation debate. American Psychologist, 34, 740-754.

Musson, R.F. (1988). Depression, self-focused attention, and causal analysis. Unpublished doctoral dissertation. Northwestern University, Evanston, Illinois.

Musson, R.F., & Alloy, L.B. (1988). Depression and self-directed attention. In L.B. Alloy (Ed.), Cognitive Processes in Depression. New York: Gilford.

Neunaber, D.J., & Wasserman, E.A. (1986). The effects of unidirectional versus bidirectional rating procedures on college students' judgments of response-outcome contingency. Learning and Motivation, 17, 162- 169.

Newman, S.E., & Benassi, V.B. (1989). Putting judgments of control into context: Contrast Effects. Journal of Personality and Social Psychology, 56, 876-889.

Peterson, C.R. (1980). Recognition of noncontingency. Journal of Personality and Social Psychology, 38, 727-734.

Piaget, J. (1967). The child's construction of the world. Totowa, NJ: Littlefield, Adams and Company.

Powers, W.T. (1973). Behavior: The control of perception. Chicago: Aldine.

Pryor, J.B., Gibbons, F.X., Wicklund, R.A., Fazio, R., & Hood, R. (1977). Self-focused attention and self-report validity. Journal of Personality, 5, 513-527.

Reisenzein, R., & Gattinger, E. (1982). Salience of arousal as a mediator of misattribution of transferred excitation. Motivation and Emotion, 6, 315-328.

Ross, L. (1977). The intuitive psychologist and his shortcomings. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 10), New York:Academic Press.

Scheier, M.F. (1976). Self-awareness, self-consciousness, and angry agression. Journal of Personality, 44, 627-644.

Scheier, M.F., & Carver, C.S. (1977). Self-focused attention and the experience of emotion: Attraction, repulsion, elation, and depression. Journal of Personality and Social Psychology, 35, 625-636.

Scheier, M.F., & Carver, C.S. (1980). Private and public self-attention, resistance to change and dissonance reduction. Journal of Personality and Social Psychology, 39, 390-405..skip 1

Scheier, M.F., Carver, C.S., & Gibbons, F.X. (1979). Self-directed attention, awareness of bodily states, and suggestibility. Journal of Personality and Social Psychology, 37, 1576-1588.

Scheier, M.F., Carver, C.S., & Gibbons, F.X. (1981). Self-focused attention and reactions to fear. Journal of Research in Psychology, 15, 1-15.

Schlenker, B.R., & Leary, M.R. (1982). Social anxiety and self-presentation: A conceptualization and model. Psychological Bulletin, 92, 641-669.

Schustack, M.W., & Sternberg, R.J. (1981). Evaluation of evidence in causal inference. Journal of Experimental Psychology: General, 110, 101-120.

Shaklee, H. (1983). Human covariation judgment: Accuracy and strategy. Learning and Motivation, 14, 433-448.

Singer, B., & Benassi, V.B. (1981). Occult beliefs. American Scientist, 69, 49-55.

Skinner, E.A. (1985). Action, control judgments, and the structure of the control experience. Psychological Review, 92, 39-58.

Smith, T.W., & Greenberg, J. (1981). Depression and self-focused attention. Motivation and Emotion, 5, 323-331.

Stephenson, B., & Wicklund, R.A. (1983). Self-directed attention and taking the other's perspective. Journal of Experimental Social Psychology, 19, 58-77.

Tolman, E.C., & Brunswik, E. (1935). The organism and the causal texture of the environment. Psychological Review, 42, 43-77.

Treisman, A.M. (1969). Strategies and models of selective attention. Psychological Review, 76, 282-299.

Trollier, T.K., & Hamilton, D.L. (1986). Variables influencing judgments of correlational relations. Journal of Personality and Social Psychology, 50, 879-888.

Turner, R.G. (1980). Self-consciousness and memory for trait terms. Personality and Social Psychological Bulletin, 6, 273-277.

Tversky, A., & Kahneman, D. (1980). Causal schemata in judgments under uncertainty. In M. Fishbein (Ed.), Progress in social psychology. Hillsdale, NJ:Erlbaum.

Wasserman, E.A., Chatlosh, D.L., & Neunaber, D.J. (1983). Perception of caual relations in humans: Factors affecting judgments of response- outcome contingencies under free-operant procedures. Learning and Motivation, 14, 406-432.

Wasserman, E.A., & Shaklee, H. (1984). Judging response-outcome relations: The role of response-outcome contingency, outcome probability, and method of information presentation. Memory and Cognition, 12, 270-286.

White, R.W. (1959). Motivation reconsidered: The concept of competence. Psychological Review, 66, 297-333.

Wicklund, R.A. (1975). Objective self-awareness. In L. Berkowitz (Ed.), Advances in experimental social psychology (Vol. 8). New York: Academic Press.

Wicklund, R.A. (1979). The infuence of self-awareness on human behavior. American Scientist, 67, 187-193.

Wicklund, R.A. (1980). Group contact and self-focused attention. In P.B. Paulus (Ed.), Psychology of group influence. Hillsdale, NJ: Erlbaum.

Wicklund, R.A., & Gollwitzer, P.M. (1987). The fallacy of private-public self-focus distinction. Journal of Personality, 55, 491- 523.

Wylie, R. (1974). The self-concept (rev. ed.) Lincoln: University of Nebraska Press.

Zajonc, R.B. (1965). Social Facilitation. Science, 149, 269-274.

Zanna, M.P., & Aziza, C. (1976). On the interaction of repression-

sensitization and attention in resolving cognitive dissonance. Journal of Personality, 44, 577-593.

Zuckerman, M., & Lubin, B. (1965). Manual for the Multiple Affect Adjective Checklist. San Diego, CA: Educational and Industrial Testing.

APPENDIX A

Table 1

Analysis of Variance of Objective Task-related Values by Condition.

	CONDITION									
	OBSERVER		CAMERA		MIRROR		CONTROL			
	M	SD	M	SD	M	SD	M	SD	F(3,296)	p
Delta-p	16.4	9.4	15.0	9.0	16.6	10.5	14.8	10.8	.758	.518
Press	22.5	4.6	22.4	3.6	22.1	3.8	22.0	4.6	1.013	.387
Outcome	29.4	2.8	29.4	2.5	29.0	2.8	29.6	2.7	.580	.629

Delta-p = $|p(A/O) - p(A/\text{no } O)|$

Press = Number of presses

Outcome = Number of outcomes

N = 75 per condition

Table 2

Analysis of Variance for Personality and Mood Indices by Condition.

	CONDITION									
	OBSERVER		CAMERA		MIRROR		CONTROL			
	M	SD	M	SD	M	SD	M	SD	F(3,296)	p
BDI	7.6	6.47	7.9	5.77	8.2	7.02	6.7	5.08	.876	.454
MAACL	11.1	6.89	11.7	7.29	12.5	7.88	10.2	6.65	1.342	.262
PRISC	23.5	5.78	22.6	6.34	24.0	5.23	23.2	5.26	.814	.488
PUBSC	18.4	5.47	18.4	5.99	19.5	5.17	18.5	5.57	.674	.569

BDI = Beck Depression Inventory

MAACL = Multiple Affect Adjective Checklist

PRISC = Private Self-Consciousness

PUBSC = Public Self-Consciousness

N = 75 per condition

Table 3.

Descriptive Statistics for Depression and Self-consciousness Scales: Reliabilities, Correlations, Means, and Standard deviations.

	BDI	MAACLD	PRISC	PUBSC	MEAN	SD
BDI	(.85)	.71	.30	.24	7.60	6.13
MAACLD		(.68)	.16	.17	11.39	7.10
PRISC			(.70)	.39	23.30	5.67
PUBSC				(.84)	18.87	5.51

BDI = Beck Depression Inventory

MAACL = Multiple Affect Adjective Checklist

PRISC = Private Self-Consciousness

PUBSC = Public Self-Consciousness

(Cronbach alphas are on diagonal within parentheses)

N = 300

Table 4

Frequency and Probability of Low Control Judgments by Condition and Judgment Criteria.

Criterion for low judgments	CONDITION							
	OBSERVER		CAMERA		MIRROR		CONTROL	
	Freq	p	Freq	p	Freq	p	Freq	p
0	18	.24	19	.25	20	.27	9	.12
5	24	.32	24	.32	23	.31	11	.15
10	29	.39	25	.33	25	.33	15	.20
15	37	.49	29	.38	32	.43	18	.24
20	45	.60	35	.47	38	.51	21	.28
25	49	.65	43	.57	40	.53	30	.40
30	54	.72	44	.59	44	.59	38	.51

N=75 per condition

Table 5

Logit Regression: Full and Reduced models for Predicting the Likelihood of Low Control Judgments.

Predictor	Full Model Coefficient	SE		Reduced Model Coefficient	SE		Exp (B)
Conditions							
Observer	.993	.412	*	1.007	.410	*	2.74
Camera	.993	.412	*	1.007	.410	*	2.74
Mirror	.916	.415	*	.945	.411	*	2.57
Depress	1.056	.926					
PriSC	.022	.026					
PubSC	-.022	1.026					
[Constant]	-3.697	1.592		-1.7605	.326		

N=300

$\chi^2(6) = 11.4$ $p = .079$ $\chi^2(3) = 8.87$, $p = .031$

* Wald statistic significant at $p < .05$

Table 6

Frequency and Probability of Judging "No relation" by Self-awareness Conditions.

	CONDITION							
	OBSERVER		CAMERA		MIRROR		CONTROL	
	Freq	p	Freq	p	Freq	p	Freq	p
No Relation	61	.81	60	.80	52	.69	42	.56

N=75 per condition

Table 7

Logit regression: Full and Reduced Models for Predicting the Likelihood of Judging "No relation" Between Responses and Outcomes.

Predictor	Full Model Coefficient	(SE)		Reduced Model Coefficient	(SE)		Exp(B)
Condition							
Observer	1.243	.381	**	1.231	.377	**	3.423
Camera	1.095	.376	**	1.142	.371	**	3.143
Mirror	.525	.348		.575	.342		1.776
Depress	1.740	.971					
PriSC	-.047	.026					
PubSC	.031	.026					
[Constant]	-1.853	1.637		.241	.232		
N=300							

$\chi^2(6) = 21.49$, $p = .002$ $\chi^2(3) = 15.03$, $p = .002$

** Wald statistic significant at $p < .01$

Table 8

Means and Standard Deviations of Control Judgment Accuracy.

	CONDITION							
	OBSERVER		CAMERA		MIRROR		CONTROL	
	M	SD	M	SD	M	SD	M	SD
Accuracy	9.1	18.1	18.1	18.1	13.9	24.3	25.0	27.6

Accuracy = Judgment of Control - Empirical Delta-p

N=75 per condition

Table 9

Ordinary Least Squares Regression of Control Judgment Accuracy on Self-awareness Conditions

VARIABLE	B	SE	t(148)	p
OBSERVER	-15.96	4.30	-3.71	.0002
CAMERA	- 6.93	4.30	-1.61	.1081
MIRROR	-11.15	4.30	-2.59	.0099
[CONSTANT]	25.00	3.04		

$F(3,296) = 4.96$ $p = .0043$

MULTIPLE R = .2188
R SQUARE = .0479
ADJ R SQUARE = .0064

Table 10

Summary of Significant Predictors of Dependent Variables

	PREDICTORS					
	CONDITIONS					
DEPENDENT MEASURES	OBSERVER	CAMERA	MIRROR	DEPRESS	PRISC	PUBSC
JUDGEMENT OF CONTROL	+	+	+	-	-	-
JUDGEMENT OF RELATION	+	+	-	-	-	-
CONTROL JUDGMENT ACCURACY	+	-	+			

+ = SIGNIFICANT REGRESSION COEFFICIENT

- = NONSIGNIFICANT REGRESSION COEFFICIENT

APPENDIX B

Figure 1. Distributions of control judgments.

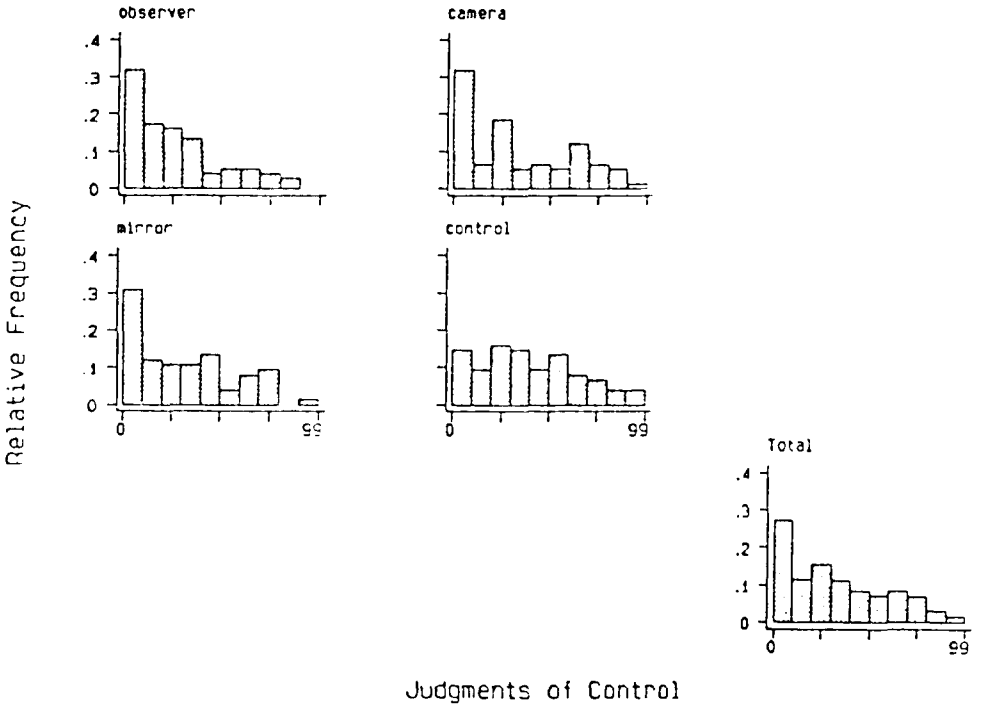


Figure 2. Log odds of judging low control as a function of cutoff critera by condition.

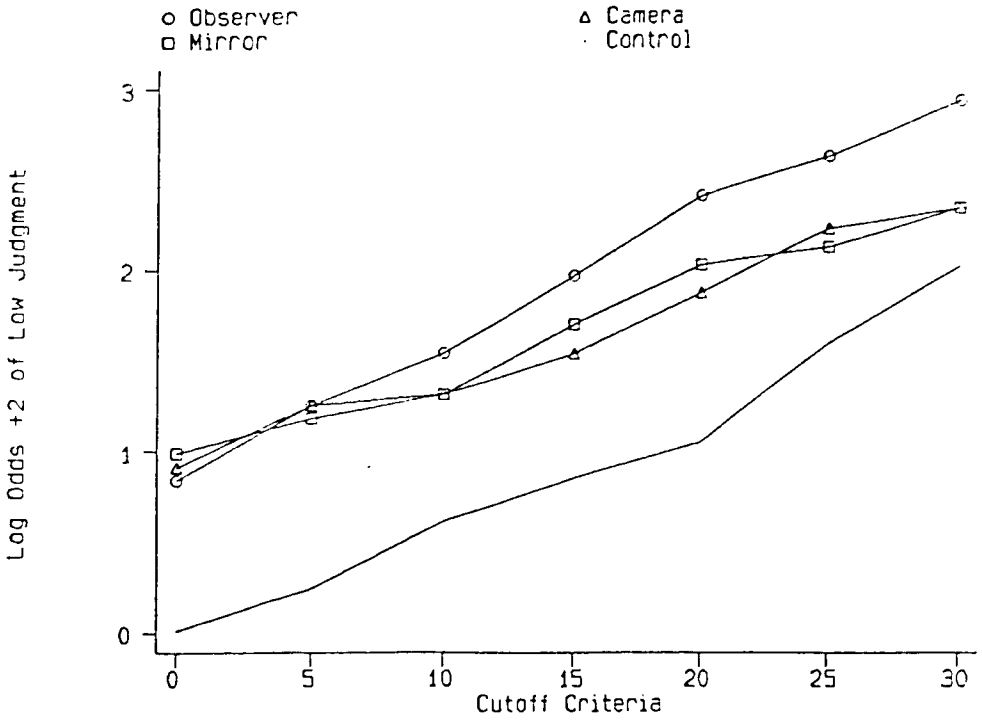
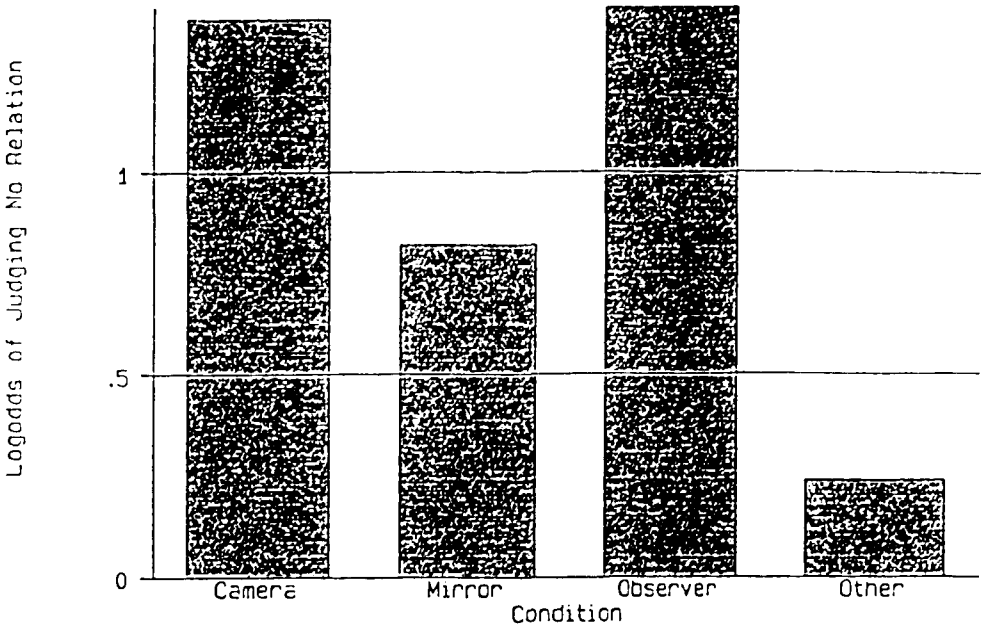


Figure 3. Log odds of judging "no relation" as a function of condition.



APPENDIX C

Judgment of Control Scale.

On the scale provided below, please indicate the degree of control that you believe that your responses (pressing and not pressing the button) had over the appearance of the blue light.

No Control	Intermediate Control	Complete Control

0-5-10-15-20-25-30-35-40-45-50-55-60-65-70-75-80-85-90-95-100

Questionnaire.

1. Pleae write the total number of times you believe the blue light appeared, regardless of whether you pressed or did not press.

   (Your answer should be between 0 and 40) _____

2. Please write the number of times that you believe you pressed the button and the blue light appeared. (0-40)

   _____

3. Please write the number of times that you did not press the button and the blue light did appear. (0-40)

   _____

4. Please write the number of times that you believe that you pressed the button and the blue light did not appear. (0-40)

   _____

5. Please write the number of times that you believe that you did not press the button and the blue light did not appear. (0-40)

   _____

6. Do feel that your responses (pressing and not pressing the button) are related to the outcome (appearance of the blue light)?

   _____No (go to question b)

   _____Yes (go to question a)

   a. Please describe the evidence that convinced you that a relationship existed.

   b. Please describe the evidence that convinced you that there was no relationship.