Invariance seeking action: Acquisition and blocking effects of causal attribution in the workplace

Suzanne Louise Reid

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INVARIAINCE SEEKING ACTION: ACQUISITION
AND BLOCKING EFFECTS OF CAUSAL
ATTRIBUTION IN THE WORKPLACE

A Thesis
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Psychology

by
Suzanne Louise Reid
June, 1995
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Approved by:

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May 30, 1995
ABSTRACT

A social analog of a short-delay conditioning paradigm in Pavlovian learning was used to test predictions concerning the influence of stimulus context of human social judgments of causality. The learning experiments was masked by describing it as a study testing a computerized employee evaluation system. Subjects were presented information about a hypothetical worker and a fictitious company's level of productivity representing a 12 or 18 month period. Consistent with contemporary models of associative learning, the results indicated that the subjects judgments of the worker's causal priority for the company productivity effect progressively strengthened as a function of repeated worker-productivity pairings. Further, limits of this acquisition effect of causal judgments were influenced by the ability of another worker to predict similar productivity level information. Implications for future research including unblocking and augmenting are discussed.
ACKNOWLEDGMENTS

As I complete my time here at Cal State, I reflect on my many experiences, but most importantly I think of the people who have made these past years so meaningful for me. I would like to sincerely thank David Chavez who first of all called me a second stringer and actually asked me to achieve something. For opening the world of cross-cultural as well as clinical psychology to me and for being a role model for both. I would like to thank my committee members: To Sandy McDougall for welcoming me into his lab without even asking me about my rat handling abilities, for your challenging and helpful ideas, and for giving me a standard through your strong work ethic when I started doing research. To Faith McClure for your commitment and willingness to help me with all of the different tasks I asked of you, and for your sincere warmth and therapeutic nature. A very special thanks to Robert Cramer, who without your mentorship, this thesis would not exist. Your complete dedication, friendship, and commitment to my education will always be remembered. You have given me a greater appreciation for scholarship, history, and detail. Thank you, and for this I will always be grateful. A loving thanks to my family, Mommy, Daddy, Julie, and Janet who have all helped me to become the person I am today. And to my true love, David Wayne Gulley, who listened to all my complaints, all my praises and supported me with constant unconditional love and encouragement. I dedicate this thesis to you.
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INTRODUCTION

Psychology has often recognized the importance of context in learning, perception, and psychophysics. The effects of context on psychological processes in humans have had monumental impact in how we ultimately perceive our environment. As a result, we attempt to make sense out of the world through event comparisons or by identifying an object's relations to another. In making social causal judgments (attributions) one must also be concerned with the relationship(s) between two or more objects. Although context and causation appear to be intimately related to how we process and interpret information from events and objects, social psychology has often failed to adequately address context effects in causal judgments. Heider (1944) recognized how context can bias our causal judgments by suggesting that, "changes in the environment are almost always caused by acts of persons in combination with other factors" (p. 361).

Theories of human causal judgment have been influenced by philosophers such as Hume (1964/1886) and Mill, (1972). Their conceptions of cause and effect have been operationalized in modern research in an attempt to devise a comprehensive theory of causal attribution. Despite several sophisticated well accepted attempts to explain such a phenomena (i.e., Heider, 1958; Jones & Nisbett, 1969; Kelly,
1967; ), a comprehensive theory has not yet emerged. Various inquiries have been made by theorists to organize the rules of causal judgments. However, scholars continue to maintain that a current disarray of attribution theory exists (Cook & Campbell, 1979).

**Purpose of the Study**

The purpose of the present study was to design a program of research investigating human causal judgments from a contemporary learning-theoretical perspective. Specifically, this study was designed to test "acquisition" and "blocking" effects in social causal judgments. The theoretical position of this thesis was assume that social outcomes or effects will automatically elicit a search for a cause or causes and therefore, the generation of cause and effect statements. This activity was termed "invariance seeking action". It was also the objective of this research to demonstrate that in accordance with contemporary learning theory, that causal judgments reflect the operation of a predictable mechanism which serves to generate additional studies that can address context effects in human causal judgments.

**Causality**

Philosophers have thought about causation and argued its meaning for centuries (Bunge, 1979). Events, changes in state, and changes in properties are all explained and thus understood by attribution to their respective causes. The
concept of causation is as basic to our understanding as are concepts of object, space, time, and logic. Toward this end, contemporary attribution theory derives its basic assumptions from the traditional philosophical views of cause and effect. David Hume, a British Associationist, has been one of the most influential of the major philosophers, establishing criteria by which a causal relation can be inferred. In "A Treatise of Human Nature" (1964/1886) Hume provided a more contemporary perspective on causality through his highly deterministic and reductionistic view of the associative process. Hume's position can be summarized with four rules: 1) spatio-temporal contiguity - the cause and effect must be contiguous in space and time; 2) temporal priority - causes must occur prior to their effects; 3) constant union - causes and effects must occur together.; and (4) the same cause always produces the same effect, and the same effect never arises but from the same cause.

John Stuart Mill (1972) also argued that what people ordinarily call the cause is arbitrarily selected and is inaccurately labeled "the cause." Interestingly, Hume was also influential in the development of two additional rules subsequently credited to Mill. The first rule is the method of agreement - which states that if several different objects produce the same effect, there must be a common quality that exists among them. The second rule was termed
the method of difference - which states that the difference in the effects of two resembling objects must come from that in which they differed. That is, one can infer cause if, when Y is not observed, X is not present. By using both the method of agreement and the method of difference, the probability that X is the cause of Y is increased. In summary, if X, then Y; if not X, then not Y.

For example, suppose that when a particular company employee is scheduled to work, that company surpasses their production quota. However, when the employee is not scheduled to work, and therefore not present, the company fails to meet the daily production quota. Thus, it would be likely that the worker's supervisor would attribute the cause of the company productivity to the employee.

The critical realist theory of cause proposed that causal perceptions are subjective constructions of the mind, while causal relationships are independent of our perceptions (Harre, 1972). Interestingly, critical realists also contend that seeking causes and effects is biologically adaptive. That is, humans are biologically prepared to automatically search for causes, thereby making their environment predictable. Accordingly, organisms that are capable of making such cause-and-effect associations are better prepared to survive than are organisms that are not. Therefore, humans make causal judgments precisely because
doing so has been adaptive in their evolution. Theoretically, humans may be biologically prepared to make causal inferences and sociologically constrained to associate only certain causes and certain effects (See Kuhn, 1992). Critical realists also believe that observation alone is not sufficient to understanding human nature, and to observe relationships among events, variables must be manipulated. In other words, causal inference result from actions. As a result, we are biologically prepared to focus on the manipulative relations between cause (X) and effect (Y), and use this mechanism to better adapt to changing circumstances.

Social Psychology

Historically, investigations of causality have been highly influential in the development of attribution theories and research in social psychology. For example, Michotte (1956) demonstrated that humans perceive cause in concordance with Hume's (1964/1886) rules of causality, and Shultz (1982) was influenced by Kant's (1982/1964) view that, "causal relations are characterized by forces of generative transmission between cause and effect" (p. 3). Specifically, attribution theories try to explain the processes by which people attribute characteristics and traits to others in order to make causal inferences about other people's behaviors (Jones & Davis, 1965; Kelley, 1967,
1972, 1973). Contemporary models of attribution which looked at choosing from a variety of putative causes the most predictive cause for a particular effect address these ideas (Kelley, 1972; Wasserman, 1990).

Fritz Heider (1944) provided the conceptual foundation from which most modern attribution theories were derived. Heider's contributions to attribution theory include his study of the processes and variables involved in how people make causal attributions (Weary, Stanley, & Harvey, 1989). Initially, Heider (1958) was curious about the process by which an untrained observer makes sense out of the actions of others. Heider's work on causality emphasized that appropriate cause and effect attributions are given to stabilize the perceived environment. He believed that when ordinary people observe an effect in their environment, they immediately search for its cause(s). He suggested that ordinary people operate like "naive scientists" when making attributions. More specifically, people observe an action and then, in an analytical way, they attempt to find the connections among various causes and effects. He explained the role of such causal judgments as bringing a degree of consistency and predictability to an individual's environment, since an unstable environment is potentially aversive and stress inducing. Heider proposed that "the
search for invariances" served to diminish the impact of our continuously variant environment.

Heider argued that people were not simply content to register the observations around them, but were motivated to bring order to the world by determining intention, ability, and environmental properties. Heider suggested that a person's ability to control the environment depended on the recognition of causal relationships. Notions of personal control are closely related to the philosophical position of both critical realists (Harre, 1972) and learning theorists (e.g. Garcia & Koelling, 1966; Seligman, 1970). For example, the critical realists view looking for causes as biologically adaptive and therefore is a part of human genetic makeup. Similarly, some learning theorists suggest there exists innate biological mechanisms which promote specific associations biologically relevant to the organism's survival. Consistent with these positions, the theoretical viewpoint of this thesis proposed that "social effects or outcomes" automatically elicit a search for causes and the generation of cause-effect statements on the part of the observer (for a discussion of directed action see Cramer, Weiss, Steigleder, & Balling, 1985; Dickinson & Balleine, 1994; Hearst & Jenkins, 1974; O'Connell & Rachotte, 1982). We have termed this activity invariance seeking action, and consider it to be analogous to an
unconditioned response (See Rule of Correspondence 3 given below).

Building on Heider's conceptual framework, Jones and Davis (1965), developed the theory of correspondent inference which focused on the relationship between the effects of an action and the dispositions inferred by those effects. The theory predicted that observers generally attribute behavior to dispositional characteristics when the environment or setting does not provide a sufficient explanation. This bias toward attributing the cause of behavior to personal characteristics of the actor are said to be the result of observers failing to adequately adjust their initial causal judgments to reflect additional information about possible environmental constraints on the behavior. Correspondence refers to the extent that a behavior and characteristics of an individual are both accounted for by the inference. The context in which a particular act occurs can provide the observer with greater meaning for the act; and the perceived intention of that act is dependent on other possible actions that are available in that particular situation. For example, if a supervisor observes that when a particular company employee is working and the company surpasses its quota, the supervisor may conclude that the employee is an efficient worker. This dispositional inference directly corresponds to the observed
behavior (e.g. surpassing quotas follow from efficient work). On the other hand, a supervisor may also infer that the employee received considerable help from coworkers in order to perform so well, or possibly the production quotas were not high enough. These latter causes are representative of external or situational factors and do not represent correspondent inferences.

Specifically, we pay more attention and infer dispositional "cause" to those behaviors which are freely chosen, produce noncommon effects and are low in social desirability (Jones & Davis, 1965). Correspondent inferences directly result from the amount of information given by the action and are determined by the three conditions noted above. Behaviors that are assumed to be freely chosen are ones that follow from an individual who acts on his/her own volition. As a result, the perceiver tends to make dispositional attributions because he/she holds the individual accountable for his/her own behavior. If an individual's behavior is not freely chosen (e.g. results from coercion or manipulation), the perceiver may hold the individual less responsible for the act, and other causes which are not dispositional, are utilized to explain the behavior. Interestingly, behavior that is not freely chosen has also been found to elicit dispositional attributions. This "fundamental attribution error" lends support to
Heider's notion that the individual tends to engulf the social field. As a result, people making attributions tend to be biased in favor of internal or dispositional causation (Gilbert & Jones, 1986; Jones & Harris, 1967; Ross, 1977).

**Noncommon effects** are distinctive outcomes that can only follow from a particular act. For example, suppose that Joe is a company manager and he and other managers always wear a tie. Wearing a tie could be considered a "common effect."

However, if one day Joe does not wear a tie to work, this action may represent a "noncommon effect," relative to the other managers' consistent choice of dress. The observer in this situation is more likely to make a dispositional inference regarding Joe's actions. One might infer that Joe no longer has a professional attitude about his job, is having a mid-life crisis, or is rebelling against company authority (dispositional attributions). Jones and Davis suggested that noncommon effects increase the likelihood that an observer will make a correspondent inference (see also Ajzen, 1971).

Engaging in a behavior that is socially desirable has been found to be less informative than unexpected or **socially undesirable** behavior, and is expected to result in correspondence inferences. That is, a person's behavior that reflects values commonly shared by the culture, the less informative that action is when identifying attributes of
the person. Socially desirable behavior results in the observer being less confident about the inferences made regarding the intent of the behavior as opposed to situations where the action is considered socially undesirable (Jones, Davis, & Gergen, 1961). In summary, the Jones and Davis model suggests that freely chosen, socially undesirable behaviors which produce noncommon effects create a "dispositional anchor" in the observer which leads to increases in internal or dispositional attributions (Ajzen, 1971; Jones & Davis, 1965).

Heider suggested that people might employ a variant of Hume's method of difference when choosing from among several putative causes, and it was from these seminal ideas that Kelley (1973) developed his model of causal attribution. Kelley's model attempts to explain dispositional and situational attributions for the behavior of one's self, as well as of others. Recall, that Jones and Davis (1965) only accounted for behavior that is initiated by others. Kelley's initial interest in attribution was to address the question of what information is used in arriving at casual attributions. Kelley also distinguished between attributions based on two different sources of information: 1) attribution when the observer has information from multiple observations, and 2) where the observer has information from only a single observation or description.
Contemporary researchers label the two sources of information as experienced and described causal situations, respectively. Kelley's **covariation principle**, described below, requires multiple observations, experienced causal situations, or what Bertrand Russell termed "knowledge by acquaintance" (See Shanks, 1991). Kelley's theory which is based on the covariation principle states that humans search for causes which occur close together in time and space with particular effects. Consistent with Hume, Kelley argued that priority is given to the cause which is present when the effect is present and which is absent when the effect is absent (Kelley & Michela, 1980).

According to Kelley (1973), attributers use three types of information to infer cause and effect relationships. The three types of information are: 1) **consensus** - the extent to which others react in the same manner to a stimulus or event as the individual being observed; 2) **consistency** - the extent to which an individual reacts to the same stimulus or event in the same way on other occasions; and 3) **distinctiveness** - the extent to which the individual being observed reacts in the same manner to other, different stimuli or events. For example, Kelley would suggest with low consensus, low distinctiveness, and high consistency, the effect will be attributed to something about the person (i.e. a dispositional attribution). McArthur (1972)
systematically varied consensus, distinctiveness, and consistency information pertaining to a behavioral act and asked subjects to indicate the cause they perceived as most plausible. Consistent with previous findings (e.g. Jones & Nisbett, 1969), the observers tended to attribute behavior to dispositions rather than to context.

When multiple observations are not possible (which is typical of many of the inferences we make), attribution for a single instance is presumed to follow what Kelley (1972, 1973) refers to as configuration. This is where a perceiver must take into account the configuration of several judgments on similar observed effects. In this instance principles of discounting and augmenting are used instead of covariation.

According to Kelley, plausible causes of an observed effect(s) can either be inhibitory (discounted) or facilitative (augmented). The discounting principle states that: "The role of a given cause in producing a given effect is discounted if other plausible causes are also present" (p. 113). For example, assume two company employees, Sam and Joe, work together. If in each month that they work together, the company surpasses its monthly production quota, each employee will be given less causal weight than if they worked had alone. Since Sam and Joe are both potential causes, for the performance, each employee is
discounted as being solely responsible for causing the effect.

Kelley's **augmenting principle** suggests, if for a given effect, both a plausible facilitative cause and a plausible inhibitory cause were present, the role of the facilitative cause in producing the effect will be judged greater than if the cause was presented alone as a plausible cause for the effect. That is, a cause was still effective in producing the behavior despite the presence of an inhibitor, and as a result, its causal priority will be augmented.

In summary, attribution theory is an extension of the philosophical concept of cause and effect applied to human thought processes. Ideas of the early philosophers provided the backbone of modern attribution theory. Heider (1944) and the critical realists argued that human causal judgment serve an adaptive evolutionary role because they bring consistency to the environment. Though several theories of human causal judgments have been developed, none can successfully explain all of the findings in a variety of attribution situations. For example, Quattrone (1982) reported a situation in which subjects were sensitized to environmental factors at the expense of dispositional characteristics and subsequently attributed behavior (erroneously) to the environmental factors. Jones and Davis' (1969) theory of correspondent inference predicted
just the opposite. Perhaps it is possible that current attribution theories, because they are based, in part, on a simple contiguity mechanism (to be discussed in the next section), are limited in their ability to predict many aspects of human causal judgment. The contextual factors in determining cause have just recently been investigated (Einhorn & Hogarth, 1986). Heider's (1958) "engulfing hypothesis" interprets behavior as more salient than contextual influences. Therefore, causal attributions will most likely reflect the dispositional characteristics of the actor, and because contextual influences are less salient, they will receive less causal priority. Certainly, much of attribution research, can be traced by Heider's work (Jones & Davis, 1965; Kelley, 1967, 1972, 1973), but these approaches do not satisfactorily explain that external causal attributions may result when situational constraints are salient.

Although attribution theory does not focus on what Tolman and Brunswick (1935) called the "causal texture of the environment," contemporary learning theory has focused much attention on the topic of context (e.g., Rescorla & Wagner, 1972; Wagner & Rescorla, 1972). In addition, contemporary theorists (e.g., Alloy & Tabachnik, 1984; Gluck & Bower, 1988) have suggested that causal attributions or contingency judgments closely parallel the conditioned response in
animals in associative learning studies (see Allan, 1993; Lovibond, 1988). Specifically, Rescorla (1988) noted that "The CS/US relations required for conditioning are very similar to those that a rational scientist would demand to conclude that the CS is the cause of the US" (p. 340, see also Dickinson, 1980). Contemporary learning theorists have also extended that role of contiguity in causal judgments to include a contingency mechanism (Shanks & Dickinson, 1987; William, 1994). Attribution research has relied heavily on a simple contiguity mechanism (Kelley's covariation principle), may also benefit from this theoretical extension. Therefore, contemporary learning theory may provide valuable theoretical tools needed to extend our understanding of human causal analysis.

Learning Theory

The British associationists (e.g. John Locke, Thomas Brown, and David Hume) formulated the rules by which associations are thought to develop. The cornerstone of the association rules was contiguity. Theoretically, events (stimuli) that occur together in time and space will be associated. Pavlov's classical conditioning research established the validity of the contiguity concept. In a simple classical conditioning situation, a neutral stimulus becomes a conditioned stimulus (CS) through repeated pairings with a biologically significant stimulus -- the
unconditioned stimulus (US) -- that elicits an unconditioned response (UR). When the organism forms an association between the CS and the US, the response to the CS is termed the conditioned response (CR). For example, if a tone (neutral stimulus) is repeatedly paired with food - a biologically significant stimulus, test animals have been observed to salivate (CR) to the tone (CS).

However, learning theorists today do not accept the sufficiency of simple contiguity in the development of associations (Kamin, 1969; Rescorla, 1968; Rescorla & Wagner, 1972). This rejection is based on the argument that simple contiguity is not applicable to most learning situations, because most learning situations are characterized by the presence of multiple CS's rather than a single functional CS. Because the organism must select from competing stimuli within a specific context, the learning task has been termed the **stimulus selection problem**. Rudy and Wagner (1975) described this problem as "one of specifying the rules whereby a relationship will or will not appear to be learned about depending upon the context of environmental events within which it is imbedded." (p. 270).

A finding contrary to a prediction based on simple contiguity is stimulus "overshadowing." Suppose two stimuli are presented in a compound and followed by US presentations, but one stimulus in the compound is more
salient (e.g. brighter, louder) than the other. Although both stimuli are contiguous with the US an equal number of times, the two stimuli do not gain equal strength in eliciting CR's. In this situation the more salient stimulus overshadows the other, in terms of associative strength acquired. One plausible explanation for this difference might be that the more salient stimulus is attended to more than the less salient stimulus. The principle of simple contiguity fails to explain the overshadowing effect. If simple contiguity was necessary and sufficient for conditioning to occur, then each CS (the more and less intense) in the compound would have conditioned equally. The overshadowing research (Kamin, 1968; Wagner, Logan, Haberlandt, & Price, 1968) began a new era in learning theory by initiating inquiry into the nature of selective association.

Support for a "blocking effect," based on prior experience to a particular stimulus not stimulus saliency comes from a series of studies by Kamin (1968, 1969). Blocking occurs when one stimulus (A) is reinforced prior to its presentation in a compound with another stimulus (X). Because of the prior conditioning to stimulus A, stimulus X, in subsequent reinforced training trials (AX+), acquires less associative strength (i.e. blocked). That is, the associative strength conditioned to X depends on the
stimulus context in which it is paired with a US. If stimulus X is presented alone with a US, it will reach an asymptotic value close to that when stimulus A was presented alone. If stimulus X is presented in compound with A, and A already predicts conditioning to the US, conditioning to X is blocked. Again the principle of simple contiguity fails to explain the blocking effect.

In demonstrating the blocking effect Kamin (1968, 1969) developed a three phase experimental sequence using a conditioned suppression procedure. During phase one, stimulus (A) was paired with the US in the experimental group, while a control group received no single stimulus conditioning. During phase two the experimental and control group received conditioning trials in which stimulus (A) is presented in a compound with (X) and paired with the US (AX+). A subsequent test of response strength to stimulus (X) alone indicates that less conditioning occurred to stimulus (X) in the experimental group than in the control group. Arguably, conditioning to (X) was blocked in the experimental group because prior conditioning to (A) reached asymptote thus allowing the US to become ineffective and therefore no new conditioning to (X) could occur. Rescorla (1968) successfully explained findings such as overshadowing and blocking using a contingency mechanism. The contingency principle emphasized not only the way the stimuli are
paired, but also the number of times each stimulus occurs by itself. Because contingency is analogous to correlation a CS that is contingent with a US will predict, in varying degrees, the presence or absence of the US. Conditioning therefore depends not only on the contiguity between the CS and US, but on the type of information that the CS provides about the occurrence of the US. Rescorla (1968) described this as "the relative probability of occurrence of the US in the presence of the CS as contrasted with its probability in the absence of the CS" (p.1). For conditioning to occur, it is not only necessary that the stimuli be paired (contiguous), but that they be paired in a specific way.

Conditioning is no longer seen as a mechanical process in which the control over a response is passed from one stimulus to another. Drawing from the associationist tradition in philosophy, conditioning is viewed as the learning that results from exposure to relations among events in the environment. The insufficiency of simple contiguity for producing conditioning can be illustrated by results that have been available for some time.

**Social Learning**

The proposed research assumed that attributional judgments are learned responses to events occurring in context. Following Hume (1888), Shanks and Dickinson (1987), noted that, "a causal judgment is seen as reflecting
no more than the strength of the relevant association between the mental representations of the cause and effect, with the principles governing such attributions being those of associative learning." (p.230). Hence, an interpretation of causal judgments based on modern learning-theoretical principles would provide a base from which to predict effects of stimulus salience (e.g. the conditions in which behavior does and does not engulf the social field.), overshadowing and blocking effects, effect variation (e.g. US intensity), and the conditions necessary to select from a variety of putative causes presented in compound.

Recent studies of causal judgments, although not normally addressed in terms of stimulus selection, have investigated contextual variables and their effect on causal judgments (Algom & Bizman, 1983; Alloy & Tabachnik, 1984; Gluck & Bower, 1988; Shanks & Dickinson, 1987; Wasserman, 1990). In demonstrating parallels between animal conditioning and human causal judgments, Shanks and Dickinson (1987) showed that when human subjects are given a task to judge the relationship between an action and an outcome, their judgments are sensitive to contingencies between the probability of the outcome given the action $P(0/A)$ and the probability of the outcome given no action $P(0/-A)$ (recall Rescorla, 1968). Previous research has also shown that acquisition and blocking effects occur in human learning.
(Chapman, 1991; Chapman & Robbins, 1990; Cramer, Weiss, Steigleder, & Balling, 1985; Dickinson, Shanks, & Evenden, 1984; Shanks, 1985). Using an operant learning paradigm, Dickinson et al. (1984) asked subjects to judge the extent to which pressing a key caused an effect to occur on a computer screen. In the first stage of the study subjects witnessed trials on which an alternative cue (B) reliably predicted the effect. In the second stage, subjects performed the action (A) at the same time cue (B) occurred, and this combination of potential causes was followed by the effect. Finally, subjects made judgments about the causal relationship between the action and the effect. Dickinson et al. found that the subject's judgments were significantly reduced in the blocking condition compared to the control condition in which cue (B) had not been paired with the effect in the first stage.

In a more recent study, Wasserman (1990) evaluated the parallels between animal associative learning and human causal judgments by exploring the empirical convergence of experimental manipulations in both domains. Wasserman (1974) showed that in his autoshaping procedure with pigeons, and in his study with humans (1990), the learning curves of pigeon keypecks and human causal ratings over differential correlations of stimulus compounds, demonstrated a similar pattern. In Wasserman's study (1990) college students were
asked to judge the efficacy of three foods (peanuts, shrimp and strawberries) in causing a patient's allergic reaction. Food combinations were varied along with the presence or absence of the allergic reaction. Wasserman found that if a subject can predict that shrimp, for example, cause the allergic reaction and peanuts did not, shrimp is given causal priority. More specifically, shrimp and peanuts had different associative strengths depending upon the differential correlation with the occurrence or non-occurrence of the illness. However, if a subject would not discriminate whether or not it was the shrimp or the peanuts causing the allergic reaction, then both foods were given causal priority. In essence, both foods had the same associative strength. Consistent with contemporary learning theory, Wasserman demonstrated that subjects trying to judge an effect from multiple causes use information about the differential predictiveness of each of the stimuli.

The developments in the research mentioned above indicated the possibility that models of associative learning may have explanatory value in human causal judgments. In addition, what seems to be common among all of the studies previously mentioned, is how the perceiver makes causal judgments given information about the differential associative strength or probabilities of potential causes and effects in the causal judgment task.
Therefore, social causal judgments in the present study were addressed in terms of the stimulus selection problem.

**Statement of the Problem**

Several theoretical frameworks have been postulated to explain human perception of causation from a social psychological perspective (Heider, 1958; Kelley, 1967; Jones & Davis, 1965), and a learning perspective (Allan, 1993; Shanks & Dickinson, 1987). In general, these two approaches represent social psychologist's "rule governed" explanations versus learning psychologist's associationist models. Consistent with these two approaches however are concepts such as the covariation principle and simple contiguity. Unfortunately, even with the widespread use of these principles by attribution theorists, certain attribution effects are more difficult to explain by a "rule-governed" approach (e.g. acquisition, augmenting, blocking, contingency effects, overshadowing) when compared to the learning approach. The present study is a part of a series of investigations which explored attribution hypotheses using well-established conditioning principles. By employing general learning theory, the stimulus selection problem noted above will be addressed. Clearly, support for the use of learning theory in the prediction of individual behavior has been successfully demonstrated (e.g., Cottrell, 1968; Cramer, Weiss, Steigleder, & Balling, 1985; Dollard &
Miller, 1950; Lott & Lott, 1968, 1972; Steigleder, Weiss, Cramer, & Feinberg, 1978; Zajonc, 1965). Using a general programmatic approach termed "extension of liberalized S-R theory" by Neal Miller (1959), this project proposed that under certain conditions, human causal judgments reflect acquired response priorities that can be attenuated or blocked. In such instances the US is the behavior or environmental effect that elicits a search for an explanation (e.g., in the present research a small company's level of productivity for a given month). The CSs are the putative causes (e.g., employees in a company), and a causal judgment represents the strength of association between the effect and one or more of the putative causes. Hence, the attribution of cause is simply an indication that an association has been formed between a specific stimulus/putative cause and an effect.

**Technique of Theory Construction**

Through the use of analogy, a relatively well understood conditioning paradigm was used to guide the investigation of a less well-understood research area (e.g. social causal judgments in context). In particular, analogies were be drawn between independent and dependent variables in learning and the variables assumed to be important in the development of social causal judgments. Consistent with this construction, the relations holding among the variables in
the conditioning model should, theoretically, hold among the corresponding social attribution variables (Campbell, 1920; Hesse, 1966, 1974, 1980; Masterman, 1980; Oppenheimer, 1956).

**Rules of Correspondence.**

Although the rules developed here are illustrative rather than exhaustive they are sufficiently detailed to permit initial theoretical development. The derivation of acquisition and blocking effects follows. Corresponding to a conditioned stimulus (CS), or antecedent stimulus, is a discriminable social stimulus, such as a worker (Rule 1). Corresponding to an unconditioned stimulus (US) or a consequent is a social stimulus, such as a company's productivity level, which elicits "invariance seeking action (ISA)" (Rule 2), and the ISA so elicited is analogous to an unconditioned response (UR) (Rule 3). The conditioned form of the UR analog (strength, speed, or probability of invariance seeking action) corresponds to a conditioned response (CR) (Rule 4). The number of CS-US pairings (reinforced trials) corresponds to the number of CS analog-US analog pairings, such as the number of times the worker is paired with company productivity information, and constitute "invariance seeking action" acquisition trials (Rule 5). A trial on which the worker is not followed by production information represents a CS alone or extinction
trial (Rule 6). Presenting US-analogs in the absence of CS-analogs constitutes a US alone trial, such as presenting company productivity information when a specific worker was not present (Rule 7). Corresponding to a reinforced compound CS trial is an ISA trial where two or more social stimuli, such as worker (A) and worker (X) are jointly paired with company productivity information (Rule 8). Corresponding to the CS saliency is the saliency or vividness of the CS analog (Rule 9). The intensity of a social stimulus, such as production information for eliciting "invariance seeking action" corresponds to the intensity of the US (Rule 10). Corresponding to an inhibition procedure is presenting two social CS analogs (one previously paired with the effect of interest (A) and one a novel stimulus (X) not followed by the effect of interest; theoretically stimulus X becomes a conditioned inhibitor of causal attribution) (Rule 11).

Hypotheses

Acquisition Effects. Contemporary conditioning models suggest that repeated pairings of a neutral cue (CS) with reinforcement (US) will contribute to the cue's acquisition of associative strength. A negatively accelerated increasing learning curve for the conditioned response (CR) will result. Developing and manipulating analogous attribution independent and dependent variables should produce empirical
relationships which are similar to the conditioning relationships noted above. Hence, we predicted that repeatedly pairing a single worker (A) (CS analog) with company productivity information (US analog) would result in the development of stronger casual attributions to the worker. "Invariance seeking actions" \{(ISA) = CR analog\} should be evidenced by mapping negatively accelerated increasing ISA's across evaluation trials. (Rules of Correspondence 1 - 5).

**Blocking Effects.** The blocking effect hypothesis is derived from the expectation that conditioning to a single antecedent stimulus takes place in a context containing any number of other stimuli. Hence, we predicted that causal attributions to a target worker X will be blocked if he is paired with company productivity information in the presence of another worker A who reliably predicts the same productivity level. In other words, blocking should be evidenced by weaker casual attributions to the worker X because he is reinforced in context with another worker who has a history of being associated with the same productivity level. (Rules of Correspondence 1 - 5 and 8).

**METHOD**

**Subjects**

Subjects were 72 students (36 male and 36 female) from California State University, San Bernardino who were
recruited from undergraduate psychology courses. All subjects were naive to the nature of the experiment and were randomly assigned to one of three experimental conditions. All subjects were treated according to the ethical principles of the American Psychological Association. Members of the Social Learning Research Group conducted the experiment.

**Experimental Design**

In classical conditioning a discriminable antecedent stimulus is paired with a discriminable consequent stimulus. In the present study the antecedent stimuli were fictional workers named Sam (Stimulus A) and Joe (Stimulus X). The consequent stimulus was a fictional company's productivity level. The experiment can be described as a 3X6, Groups X Trials repeated measures design. The first independent variable (3 levels) will be the context in which the target worker Joe (X), is paired with the company productivity information. The level of productivity was a held constant across all trials. Invariance seeking action trials constituted the second independent variable (6 levels). The subject's strength of causal attributions to worker X, defined as the subject's estimate of worker X's effectiveness in causing the company's level of productivity (i.e. strength of invariance seeking action), measured on a 0-100 point scale, was be the primary dependent variable.
Other secondary dependent variables, also measured on 0-100 point scales, included subject ratings on the following: 1) subject's confidence in his/her rating of worker X's effectiveness; and 2) worker X's chances of becoming a permanent employee.

**Masking Task**

The classical conditioning analog experiment was masked as a study investigating a computerized Employee Evaluation System. This procedure allowed for repeatedly pairing workers with information about the company's productivity level. Subjects were instructed as follows: "In this study we are interested in testing the usefulness of this automated program. In order to carefully test the effectiveness of the system, it will be necessary for you to assume the role of a production supervisor in a small company." Further instructions indicated that, "Sam and Joe are college students who are available for part-time employment. It is important to evaluate them carefully because they will be considered for full-time employment upon graduation."

**Apparatus**

The subject module was controlled using an IBM 386 PC and the Micro Experimental Language (MEL) version 120. Using MEL, a picture of a hypothetical worker(s), together with information in graphic form about a fictional company's
level of productivity, was presented to the subjects. Following the presentation of the worker(s) and the graph, MEL presented a series of questions to which the subject responded on a scale ranging from 0-100 using a standard computer keyboard. For example, the first question following each target worker X trial read, "On the scale below indicate the extent to which the worker Joe was effective in causing the company's level of productivity?" Subjects responses could range from 0=totally ineffective to 100=totally effective. Another question allowed the measurement of subject's confidence in rating the worker's performance and read, "How confident are you about your ratings of the worker (Joe) being effective in causing the company's level of productivity?" A third question read, "On the scale below, indicate the worker's (Joe) chances of becoming a permanent employee." This final question served to support the masking task.

Procedure

Recruitment and Informed Consent. Subjects were asked to report to room 323 in the Biology Building where they were given preliminary instructions regarding their participation in a study designed to test a new "automated Employee Evaluation System." Upon entering the laboratory, subjects were asked to read and sign a consent form. Subjects who agreed to participate were randomly assigned to one of three
experimental groups. Each group had 24 subjects balanced for gender.

**Group 1 (A+/AX+ (Randomized)).** The purpose of Group 1 was to test the blocking of causal attribution strength to worker X in a context that included another worker, A, who already predicted a high level of company productivity. Subjects received 18 trials. The first 12 trials were combined trials representing single stimulus and compound stimulus training. On 6 A+ trials the worker Sam was presented for 5 seconds and then together with company productivity information for an additional 10 seconds. This procedure was analogous to a short delay conditioning procedure in Pavlovian learning. Following each A+ trial, subjects responded to the three questions described above modified to reflect an evaluative interest in the worker Sam. Each question was presented for 15 seconds. On the 6 AX+ trials, the worker Sam and the worker Joe were paired together for 5 seconds and then with company productivity information for an additional 10 seconds. Following each trial, the subject evaluated either Sam or Joe; hence, each worker was evaluated three times. In Group 1, the A+ and AX+ trials were randomized with the caveat that the first trial was an A+ trial. On the final 6 trials, subjects were presented with the worker Joe and company productivity information using the temporal parameters described above.
Following each of the X+ trials, subjects evaluated the worker Joe using the three questions described above. The Group 1 procedure allowed us to condition causal strength to Sam on the A+ trials. As a result, on the AX+ trials Joe was paired with company production information in the context of someone who predicted this effect, worker Sam. Blocking of causal attribution strength to Joe was expected to be observed on the 6 X+ test trials.

**Group 2 (A+/AX+ (Phase))**. The purpose of Group 2 was also to test for the blocking effect using a different procedure for presenting the A+ and AX+ trials. Subjects in Group 2 were treated similarly to subjects in Group 1 except the A+ and AX+ trials were presented in two separate phases (A+ first and the AX+ following); 6 X+ trials followed the phase training. Therefore, the first 6 trials included a worker Sam paired with company productivity information (A+). The next six trials consisted of workers Sam and Joe paired together with the company meeting the same level of productivity (AX+). The remaining six trials functioned as test trials with the worker Joe paired with the company productivity information (X+).

**Group 3 (AX+)**. Group 3 served as a control group for Groups 1 and 2. Subjects in Group 3 were treated similarly to subjects in Group 1 except the subjects were given a total of 12 worker-productivity trials. The first six trials
included the workers Sam and Joe paired together with the company productivity information (AX+). The remaining six trials were test trials where the worker Joe was paired with the same company productivity level (X+). The experiment was designed to test the hypothesis that subjects in Group 3 would provide stronger causal attributions to the worker Joe than subjects in Groups 1 and 2.

Debriefing

Before leaving the lab, subjects were completely debriefed regarding the purpose and goals of the research study, and all of their questions were answered.

RESULTS

The analysis focused on the subjects' ratings of causal strength to a worker and the subjects' confidence in their judgments. The dependent variables used to test the hypotheses were measured following each of the 6 A+ acquisition trials in Group 2, and the 6 X+ test trials in each group. The means and standard deviations for the subjects' estimates of cause are presented in Table 1. A simple repeated measures model and a Groups by Trials model were used to test predictions regarding acquisition effects and blocking effects, respectively. Analysis for the possibility of gender effects revealed no reliable gender related results. Therefore, in the analysis reported below the gender variable was collapsed.
Acquisition

To examine the acquisition of causal strength a simple repeated measures ANOVA was performed on subjects' causal ratings across 6 A+ trials. As predicted, Group 2 (Phase) evidenced a gradual learning curve of causal strength to stimulus A (Sam, see Figure 1). The simple repeated measures ANOVA revealed a significant acquisition effect for causal strength, $F(5, 115) = 4.32, p < .001$.

Blocking

Drawing from contemporary learning research we predicted that social causal judgments are not merely a function of covariation, but are influenced by contextual cues. Specifically, Groups 1 and 2 tested causal attribution strength to worker X (Joe) in a context that included another worker, A (Sam), who predicted a high level of company productivity using random and phase procedures, respectively. Subjects' causal attributions to worker X in Groups 1 and 2 were compared to causal attribution to worker X in Group 3. Blocking of causal attributions to X were expected in Groups 1 and 2. In addition, an analysis for the possibility of group effects for conditions 1 and 2 revealed no reliable differences, $F(1, 46) = 3.93, p > .05$.

Group 1 (A+/AX+ (Randomized)). Subjects mean causal strength to worker X was higher in Group 3 than the ratings in Group 1. As expected, Group 1 (Random) and Group 3 (Control)
Table 1
**Descriptive Statistics for the Independent and the Dependent Variables.**

<table>
<thead>
<tr>
<th>Groups</th>
<th>A+ Test Trials</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<td><strong>Acquisition</strong></td>
<td></td>
<td></td>
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<tr>
<td>M</td>
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<td>75.4</td>
<td>78.4</td>
<td>79.5</td>
<td>81.0</td>
<td>79.1</td>
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<tr>
<td>SD</td>
<td>26.8</td>
<td>19.7</td>
<td>14.0</td>
<td>12.2</td>
<td>12.4</td>
<td>13.0</td>
<td></td>
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<tr>
<td><strong>Groups x+ Test Trials</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Group 1</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>M</td>
<td>65.5</td>
<td>66.9</td>
<td>67.2</td>
<td>67.5</td>
<td>72.0</td>
<td>69.2</td>
<td></td>
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<tr>
<td>SD</td>
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<td>15.8</td>
<td>16.2</td>
<td>15.8</td>
<td>17.1</td>
<td>17.9</td>
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<tr>
<td>SD</td>
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<td>13.1</td>
<td>13.7</td>
<td>13.1</td>
<td>13.9</td>
<td>13.9</td>
<td></td>
</tr>
<tr>
<td><strong>Group 3</strong></td>
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</tr>
<tr>
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<tr>
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<td>8.6</td>
<td>11.4</td>
<td>12.0</td>
<td>10.9</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** N = 24
Figure 1

Acquisition Curve of Causal Judgments for Worker A+ (Sam) in Group 2 (Phase)
differed in mean causal strength ratings to worker X (Joe), see Figure 2. A 2 X 6 (Groups X Trials) repeated measures ANOVA revealed a significant group effect, $F (1, 46) = 18.21$, $p < .001$. No trials or interaction effects were obtained.

Group 2 (A+/AX+ (Phase)). Subjects mean causal strength to worker X was higher in Group 3 than the ratings in Group 2. As expected, Group 2 (Phase) and Group 3 (Control) differed in mean causal strength ratings to worker X (Joe), see Figure 2. A 2 X 6 (Groups X Trials) repeated measures ANOVA revealed a significant group effect, $F (1, 46) = 5.16$, $p < .028$. No trials or interaction effects were obtained.

Confidence

Given the importance of the primary measure, causal judgment strength or strength of "invariance seeking action," it was important to determine that the results were not an artifact of the conditioning procedure. Specifically, we attempted to eliminate the alternative explanation that conditioned causal judgment strength ratings differed as a result of the subjects' confidence in their judgments.

Therefore, subjects were asked to rate their confidence in their causality judgment on each conditioning trial. Not surprisingly, a simple repeated measures ANOVA revealed a significant trials effect for confidence ratings of causal strength to A+ (Sam) in Group 2 (Phase), $F (5, 115) = 5.07$, 38
\( p < .001 \). That is, with increasing experience, the subjects' confidence in their causal judgments to A (Sam) predictably increased across trials (see Figure 3). Two 2 X 6 (Groups X Trials) repeated measures ANOVA on the X+ test trials for the blocking effect comparisons described above failed to reveal any statistically reliable differences for subjects confidence ratings.
Figure 2

Mean Causal Strength to Worker X (Joe) for Each Experimental Group
Figure 3

Acquisition Curve of Confidence Ratings for Worker A+ (Sam) in Group 2 (Phase)
DISCUSSION

The goal of the present study was to use modern conditioning theory to examine processes underlying human judgments of causality. The present study was a part of a larger program of research designed to extend previous work in causal attribution (e.g., Johnston, 1995; Kuhn, 1993; William, 1994). It was our intention to not only overlap current thinking in social psychology, but to eventually contribute novel explanations and predictions for familiar and unfamiliar results. The causal attribution research described in the literature, although clearly sophisticated, does not yet contain a systematic foundation for predicting and explaining social attributions in context. It was our intention to extend current attribution theory, which has primarily focused on simple contiguity mechanisms or rule governed approaches by testing additional principles guided by contemporary associative learning. Blocking effects, in learning psychology, have not eliminated the explanatory power of contiguity but have indicated that a simple-contiguity model for relationship (cause/effect) results is not sufficient for explaining those results. Attribution theory can be extended by testing specific predictions about how causal attributions acquire strength over repeated presentations of relevant information. And, by specifying
In addition, the associative tradition in philosophy views conditioning not as a response passed from one stimulus to another, but instead, as the learning that results from exposure to relations among events in the environment. Given this distinction between historical models of conditioning and contemporary learning theory, hypotheses analogous to those developed by modern conditioning researchers were tested. More specifically, we generated hypotheses to test acquisition effects and blocking effects in causal attribution.

**Acquisition Effects**

The acquisition effect hypothesis was tested by pairing a single worker (CS analog) and a company's productivity information (US analog). We predicted that acquisition was a function of repeated pairings of the CS analog with reinforcement (US analog). In particular, we expected and found that repeated pairings of a single worker (A) with company productivity information would result in the development of stronger casual attributions to the worker over trials. Causal attributions or "Invariance seeking actions" \((ISA) = CR\) analog were evidenced by observing a negatively accelerated increasing function for ISA's across evaluation trials (Rules of Correspondence 1 - 5).
The observation acquisition effect is extremely important. Shanks and Dickinson (1987) argued that increases in causal attribution contingency judgment strength resulting from experience represents an important difference between rule governed approaches and associative approaches to an analysis of human causal judgment. Allan (1993) examined rule governed and associative accounts of human contingency judgments and concluded that the available data were best explained by associative principles. Acquisition effects played an important role in defining differences between the cognitive and the Pavlovian accounts. An inspection of Figure 1 also indicated that subjects, unexpectedly, started out at a relatively high level of causal strength \((M = 66.04)\). Theoretically, beginning at a lower level of causal strength would have enhanced the acquisition effect, defined as amount of change across conditioning trials. A possible explanation for the higher initial ratings is that subjects were informed about a hypothetical "productivity goal" (see Appendix A, page 45). The level of production reported each month exceeded this arbitrary goal, therefore a certain amount of productivity success could be inferred. As a result, judgments of causality and therefore acquisition of cause would not be expected to begin at a "zero" level.
**Blocking Effects**

The blocking effect hypothesis was based on the expectation that conditioning to a single antecedent stimulus takes place in a context containing any number of additional stimuli. We found support for the prediction that causal attributions to a target stimulus worker X would be blocked when he was paired with company productivity information in the presence of another worker, A, who already reliably predicted the same productivity level. (Rules of Correspondence 1 - 5 and 8). Regardless of conditions, random or phase, significant blocking effects were observed. For both the randomized and phase blocking procedures, causal attributions to worker X were less than attributions to worker X in the control group. Interestingly, the random procedure evidenced a somewhat greater reduction in causal attribution strength than the phase procedure. Theoretically, a simple contiguity process should have yielded similar causal judgments to worker X across the three groups, however, the result of the present research indicated that evaluations of the worker as an effective "cause" decreased as the baserate productivity had already been established by presentations of another worker A with production information.

The present research underscores the importance of the "causal environment" with regard to attributions in the
workplace. Consistent with our research, Japanese principles of management (e.g., Deming Model) suggest that performance appraisals can be confounded by the context, or "system" within which the individual works. In traditional employee evaluations, however, context effects are not usually a consideration and as a result may lead to erroneous conclusions regarding the worker's overall effectiveness. Recall that the target worker X's performance in the present study did not vary across experimental groups. However, the "supervisors" (the subjects) rated worker X in Groups 1 and 2 as less effective when company productivity level was already predicted by another worker who reliably predicted productivity performance.

Confidence Ratings

Group differences in the subjects' causal judgments were expected to be the result of learning-theoretical manipulations effecting the associative process, not the result of increases or decreases in confidence in making the judgments themselves. To determine that subjects' causality judgments were not confounded by confidence in their judgments, subjects were asked to rate their confidence in their judgments using a 0 to 100 point scale. Consistent with a priori predictions, confidence ratings increased across the evaluation trials, indicating increased confidence resulting from experience (see Figure 3), but
subject confidence did not differ between experimental groups. Subjects were not confused, rather, they responded in a predictable manner, making orderly judgments to the stimuli presented. This outcome is consistent with confidence ratings reported by Shanks and Dickinson (1987), and provides additional support for the associative learning model of causal judgment strength.

Limitations on Reported Effects

The results, like the results from any theory-generated research program, should be interpreted within a narrow range of conditions (Logan, 1959). In fact, the method used here served as an explicit statement of some of the boundary conditions, particularly in regard to the discrete trials procedure (e.g. repeated CS-US analog pairings, temporal variables held constant, US analog intensity held constant, etc.). In social psychology, investigations regarding strength of causal judgments frequently use descriptions of social action rather than presenting information about behavior over time. That is, subjects are frequently asked to make an attribution based on information from a single description. The present study, because it used analogies of a familiar learning paradigm, involved multiple presentations of the stimuli, an experienced situation. The context effects reported here, using an analog of the short delay conditioning paradigm, may generalize only to
situations where information is presented repeatedly rather than merely described. However, studies have shown that conditioning analogies from both instrumental and Pavlovian learning models have successfully been used to study a variety of social phenomena. Other conditioning analogies include attraction (Clore & Bryne, 1974; Cramer, Wiess, Steigleder, & Balling, 1985); competition (Steigleder, Wiess, Cramer, & Feinberg, 1978); altruism (Wiess, Buchanan, Altstatt, & Lombardo, 1971); and male sex-role action (Cramer, Lutz, Bartell, Dragna, & Helzer, 1989).

Furthermore, Shanks (1991) argued that an innate mechanism for associative learning exists and functions in experienced situations, especially when those experienced situations are unfamiliar. Judgments in described situations would then be based on the judgments developed over time from the experienced situations. It is the purpose of the present paper to identify general laws of learning that might account for all types of causal judgments in both descriptive and experienced situations.

Implications for Future Research

Because of the trend toward forming small groups of employees or teams in a variety of contextual arrangements, future research is warranted in testing a "supervisor's" strength of causality judgments to part-time employees in other novel and more complex situations that are analogous
to learning phenomena. In addition to the acquisition and blocking predictions, a reinforcement-context type theory (see Rules of Correspondence) can generate a number of hypotheses. Although various kinds of sophisticated stimuli and reinforcers could be used, the predictions offered here employ discriminable workers and productivity levels, respectively. The present procedure allowed us to condition causal strength to Sam on the A+ trials. As a result, on the AX+ trials Joe was paired with company production information in the context of someone who predicts this particular effect, worker Sam. Worker Joe is redundant in this case; he predicts nothing new, at least in terms of productivity information. Blocking of causal attribution strength to Joe would be expected and was observed. However, if worker X is presented in a compound with another worker A, but A and X are paired with higher levels of productivity (magnitude of reinforcement), worker X is not redundant and therefore would not be blocked. Compared to attributions of cause to worker X in a control group, where productivity information would be held constant on the A+ and AX+ trials, subjects in the experimental group with the higher levels of productivity would be expected to rate X more at cause. That is unblocking is expected to occur if the presence of worker X signals higher levels of productivity (Rule 9) than the productivity level used in the initial acquisition of causal
strength to worker A.

Whereas the blocking of causal attribution to worker (X) results from prior experience with a worker (A), who already predicts company productivity, augmenting of a worker (X) results from prior experience with a worker (A) who predicts no information about the company's level of productivity. Kelley's augmenting principle suggests that, if a cause can succeed in producing the behavior in the face of an "inhibitor", the cause will be seen as having a greater role than if it were presented alone. For example imagine that the worker Sam is associated with no information about a company's productivity level. Suppose the company hires a new employee, Joe, to work with Sam and productivity level information is now available, Joe's perceived effectiveness as a contributor to the company's productivity, in the context of worker Sam, who does not predict such information, is expected to be augmented, or increased. The above examples of the future research are intended to be illustrative rather than exhaustive of the predictions which can be generated using the Rules of Correspondence listed above.

Conclusion

The specific construction of a reinforcement-context type theory and the sample predictions generated from it clearly demonstrates the importance we place on recognizing the role
context plays in the development of causal attribution. Overall, the present study was supported. Acquisition and blocking effects of causal attribution to a worker were observed in support of the study's hypotheses.
APPENDIX A

Instructions for all Experimental Groups

Preliminary Instructions. In this study we are interested in testing a computerized employee evaluation system. Your cooperation is necessary for testing the usefulness of this automated program. In order to carefully test the effectiveness of the system, you will need to assume the role of a supervisor in a small company. You will be given information about a part-time employee, Joe and his company's level of productivity. Joe is a college student who is available for only part-time employment. It is important to evaluate Joe carefully each month because he will be considered for full time employment upon graduation.

Instructions Prior to Practice Trial. On some occasions, the left side of the screen will show a picture of a part-time employee named Sam or Joe. On other occasions, the left side of the screen will show a picture both part time employees named Sam and Joe. On the right side of the screen is a graph depicting the company's monthly productivity level will be presented. Productivity is measured on a 0-10 point scale. The company's monthly productivity goal is set at level 5.
Appendix A (cont'd)

Following each monthly productivity report you will be asked to rate the employees on their OVERALL performance on a "0 to 100" point scale. After reading each item carefully please respond by using the numeric keypad on the right side of the keyboard. After entering any number between "0 to 100" (including 100) please wait for the next evaluation item to appear.
APPENDIX B

Consent form

I am volunteering to participate as a subject in this study. I understand that the purpose of this study is to test the efficiency of a computerized employee evaluation system. I understand that the information will be presented to me via a computer monitor and that I will be asked to assume the role of a production supervisor in a large company. I understand that my name will NOT be included in the experiment itself and that my anonymity will be maintained at all times. I also understand that my participation in this study is voluntary and that I may refuse to answer any questions at any time. I also understand that I may withdraw from this study at any time without penalty or prejudice. I also understand that any questions I may have regarding this study will be answered.

I understand that all the information collected in this study will be treated as confidential with no details about my responses released to anyone outside the research staff without my separate and specific written consent. I understand that I may derive no specific benefit from participation in this study, except perhaps from feeling that I have contributed to the development of psychological knowledge.

I hereby allow this research group to publish the results of this study in which I am participating, with the provision that my name and/or other identifying information be withheld. This study is being conducted by psychology students under the supervision of Dr. Robert Cramer, PS-211, extension 5576. I understand that if I have any questions or concerns about the study or the informed consent process I may also contact the Psychology Department Human Subjects Review Board at CSUSB.

Participants Signature: ----------------------------------

Participants Name (Printed): ----------------------------------

Date: --------------------------

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APPENDIX C

Debriefing Statement

The present study is part of a series of research projects designed to investigate human social causal judgments. Unfortunately, in order to adequately investigate this social phenomenon a small deception of the subjects was necessary. Rather than directly asking questions concerning your social causal judgments, we explained the study as testing the efficiency of a computerized Employee Evaluation System. The company, its employees, and the evaluation system were fictitious. We apologize for this deception, however, if we had asked directly about your causal judgments your responses may have been effected.

(Stop. Are there any questions?)

It is our sincere hope that the necessity for deception is understood. It is important for the completion of this study that you do not speak with other students on campus about your experience here today. If other potential subjects are aware of the purpose of the experiment, the results of the study might be compromised.

The present study conforms to the ethical principles established by the American Psychological Association. We are interested in obtaining your comments or reaction regarding your participation in our experiment. This information would serve as a basis for checking and evaluating the quality and care with which our research is conducted. Please feel free to comment or ask questions. For results concerning the present study contact Dr. Robert Cramer, at (714)-880-5576.
APPENDIX D

CS/US Single Stimulus A (Sam) Trial
Appendix D (cont'd)

CS/US Compound Stimulus AX+ (Sam and Joe) Trial
References


