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Vicarious reinforcement is a result of earlier learning

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VICARIOUS REINFORCEMENT IS A RESULT OF EARLIER LEARNING

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by

Maricel Cigales

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To: Dean Arthur W. Herriott
College of Arts and Sciences

This dissertation, written by Maricel Cigales, and entitled Vicarious Reinforcement is a Result of Earlier Learning, having been approved in respect to style and intellectual content, is referred to you for judgement.

We have read this dissertation and recommend that it be approved.

Scott Fraser

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The dissertation of Maricel Cigales is approved.

Dean Arthur W. Herriott
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Dr. Richard L. Campbell
Dean of Graduate Studies

To Ted,

for years of patient support,

thank you.

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ABSTRACT OF THE DISSERTATION

VICARIOUS REINFORCEMENT IS A RESULT OF EARLIER LEARNING

by

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Florida International University, 1995

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The term "vicarious reinforcement" has been used by social-learning theorists to denote imitation that results from the observed reinforcement of behavior performed by a model. This conceptualization is incompatible with that of behavior analysis because it ignores the effect of prior learning on the observer's behavior and violates the definition of reinforcement. Experiment 1 replicated prior findings. Preschool children (N=32) imitated a model's reinforced choice responses, in the absence of direct experience with contingencies. In Experiment 2 (N=48), subjects failed to imitate reinforced modeled behavior when observed behavior contingencies were 'incongruent' with those experienced. The results were interpreted as consistent with the behavior-analytic position that observed reinforcement of a model's behavior functions as a discriminative cue (S^D), not reinforcement, for the observer's imitative responses.

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Chapter I

Introduction

"Vicarious" conceptualizations of behavioral phenomena were proposed by Bandura (1965, 1969) to account for changes in the behavior of an observer as the result of witnessing a model's behavior and its consequences. Vicarious-reinforcement and it variants have been the focus of a large body of research over the past 35 years, most of which has been generated by Bandura's social-learning theory. However, the vicarious-reinforcement conception is incompatible with behavior analysis and the operant-learning literature which have advanced conditioning processes to explain overt and covert behavior. This paper argues that traditional operant-conditioning processes can account for many, if not all, behavioral phenomena that have been classified as resulting from vicarious reinforcement.

Chapter 2 begins by defining the term "vicarious" as it has been used in the relevant literature. Imitation is then discussed as the basis of several vicarious phenomena. Finally, the numerous and often-overlapping concepts that may by found under the rubric or "vicarious" are then defined and the behavioral phenomena to which they apply are delineated. Behavior-analytic conceptualizations are proposed for each concept.

Chapter 3 focuses specifically on the vicarious reinforcement literature. Empirical evidence that has been interpreted as support for the concept of vicarious reinforcement is presented, as well as disconfirming research findings. Finally, an operant-learning based re-conceptualization of vicarious reinforcement phenomena is proposed.

Chapter 4 presents the results of two empirical studies that tested the above-mentioned re-conceptualization of vicarious reinforcement. Finally, Chapter 5 integrates the current findings with previous literature and provides a behavior-analytic interpretation of the results.

Chapter II

Vicarious and Related Processes

Over the past 50 years researchers have proposed numerous "vicarious" concepts to explain behavior. For example, Bandura's social-learning theory includes the terms "vicarious reinforcement", "vicarious punishment", "vicarious extinction", "vicarious arousal", "implicit reward", "vicarious classical conditioning", and "observational learning" (Bandura, 1969, 1971, 1977). Other associated terms are "vicarious instigation", identification, "vicarious learning", imitation, modeling, social facilitation, local enhancement and imitative learning (Bandura, 1971; Berger, 1962; Dubner, 1973; Gewirtz, 1971b; Green & Osborne, 1985; Hinde, 1970; Sharpley, 1985; Thelen & Rennie, 1972; Thorpe, 1963).

Most of these concepts are founded on cognitive interpretations of overt behaviors. There is much imprecision in the application of such terms, many of which are used interchangeably in the literature (e.g., Bandura, 1965a). Additionally, there is often overlap in concepts such as observational learning, vicarious reinforcement, and imitation in terms of the behavioral phenomena they describe (Browder, Schoen & Lentz, 1986; Green & Osborne, 1985; Hinde, 1970). The outcome of this has been a tangled research and conceptual literature in which the exact meanings of terms vary depending on the setting in which the phenomenon occurs, the stimuli associated with the phenomenon, the types of behaviors involved and the theoretical position of the author.

Such ambiguity may diffuse researchers' ability to explain efficiently and consensually processes underlying the myriad behavioral phenomena considered by some to be "vicarious," and may permit some to conclude that there has been explanation when only the appearance of explanation has been presented. At a minimum, this ambiguity can impede clear discussion both within and across theoretical lines about these phenomena. In the absence of a common language about so-called vicarious events, the operational definitions of such phenomena should clearly denote the stimulus conditions and processes necessary for their differential classification. These measures should lead to stricter and more precise use of terms. More importantly, the need for labels that include the term "vicarious" should be carefully evaluated. As will be discussed in subsequent chapters, many so-called vicarious events can be accounted for straightforwardly by operant-conditioning processes, making the 'vicarious' notion, and thereby the label, unnecessary.

In an effort to disentangle some of the many concepts that fall under the rubric of "vicarious," this chapter will define several vicarious terms, highlight areas of overlap and delineate the phenomena to which they apply. In the case of "vicarious reinforcement," the term "vicarious" has served to modify the term "reinforcement" which has been the term representing the central engine of behavior change in the behavior-analytic theory. Thus, a behavior-analytic interpretation of these phenomena will be presented as the preferred approach to the theoretical and empirical investigation of "vicarious" events.

What is Vicarious?

De Charms and Rosenbaum (1960) specified three criteria for classifying phenomenon as vicarious: 1) an individual observes a response by a model, 2) the observer does not respond to the same environmental stimuli to which the model responded, and 3) the observed consequence to the response of the model functions on the observer's behavior "as if" it were the observer who had responded. It is this third criterion that is the most nebulous. De Charms and Rosenbaum suggested no objective means of determining as-ifness. Many behavioral phenomena that result from operant learning may appear "as if" they were due to vicarious stimulus conditions. Furthermore, the authors' "as if" criterion does not consider the functional relations that may exist between the observer's responses and environmental events of the past or present.

Nevertheless, "as if" conceptualizations of vicarious phenomena continue to characterize social-learning theory. Thus, researchers functioning under these conceptualizations (e.g. Bandura, 1965a) consistently have neglected the role of functional stimulus-response-contingency relations, and other operant processes, in accounting for behavior that appears "as if" it were vicariously reinforced. The central postulate of the present analysis is that a behavior-analytic approach can provide a more parsimonious explanatory account of most, if not all, vicarious phenomena.

Imitation

Although imitation is not itself a vicarious event, most vicarious processes require matching of a model's behavior, which is commonly termed imitation. Indeed, imitative (i.e., matching) responses routinely are the dependent variables in studies of vicarious phenomena. Without the individual's imitative responses it would be impossible to speak of vicarious phenomena that involve the production of behavior, such as vicarious reinforcement and observational learning. Thus, the concept of imitation is an appropriate point of departure for this discussion.

Imitation has been regarded as an important component of cognitive development (Guillaume, 1926/76; Piaget, 1962; Wishart, 1986), language development (Gewirtz, 1969;

Kymissis & Poulson, 1990; Piaget, 1962; Poulson, Nunes & Warren, 1989; Meltzoff, 1988) and social development (Gewirtz, 1969, 1991; Meltzoff, 1988, Poulson, Nunes & Warren 1989; Wishart, 1986). Imitation also has played a key role in phenomena listed under the headings of identification (Gewirtz, 1991; Gewirtz & Stingle, 1968) and moral development (Gewirtz & Pelaez-Nogueras, 1991). Thus, imitation appears to be fundamental to development.

However, there has been much debate over the nature of imitation. Early theories of imitation include Thorndike's instinctive imitation, Humphery's classical conditioning, and Hull's drive theory of imitation (see Kymissis & Poulson, 1990, for a complete review). While theorists recognized environmental influences, the predominant conceptualizations of imitation at the turn of the century emphasized biologically-based mechanisms.

Miller and Dollard (1941) were the first to propose that imitative behaviors are learned and maintained by reinforcement. Although Guillaume (1926/76) had previously discussed 'learning to imitate', he viewed imitation as mediated by innate mental processes rather than environmental contingencies. Miller and Dollard's theory posits imitation as a learned drive. This notion was later echoed by Thorpe (1963, pg. 135) who defined imitation as "... the copying of a novel or otherwise improbable act or utterance or some act for which there is clearly no instinctive tendency."[1] Such conceptualizations signaled a move away from nativistic and toward learning-based views of imitation. While there is yet no consensus on the nature of imitation, most contemporary theorists and researchers agree that imitative behavior is a result of and is topographically similar to the observed behavior of another (Gewirtz & Stingle, 1968; Thelen & Rennie, 1972; Uzgiris, 1984).

Miller and Dollard (1941) distinguished between matched-dependent imitation and copying. In both cases imitative responses are maintained by reinforcement. In the case of matched-dependent imitation, the observer's behavior is cued by the model's behavior because either the observer does not have access to the environmental stimuli controlling the model's behavior, or the observer is not able to discriminate these stimuli. For example, Anne and Julia are sitting at a bus stop. After several buses pass Anne stands and approaches the curb, Julia then imitates this behavior. Two scenarios are possible. Julia (the imitator) may not

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1 Thorpe's definition of imitation has been misinterpreted to mean that only instances of novel behaviors are evidence of "true imitation" (Hinde, 1970, pg 583; Wyrwicka, 1988). However, Thorpe (1963) defined imitation in the context of distinguishing it from social facilitation (a distinction that will be discussed below). Thorpe's definition clearly allows for imitation of responses already in the imitator's repertoire.

have seen the bus, or may not have discriminated it as the awaited bus. Regardless, the imitated response would have been reinforced by boarding the long-awaited bus.[2] Future imitation of responses made by the model, in similar contexts, would therefore be more likely.

Miller and Dollard's paradigm for matched-dependent imitation provides the basis for a behavior-analytic explanation of generalized imitation and the related concept of identification. These two concepts are discussed below. At this point, however, it is important to note the function of reinforcement in the establishment and maintenance of imitative responses. It will be argued below that environmental contingencies, as proposed by Miller and Dollard (1941), can account for imitation and its related vicarious phenomena.

Copying is also a type of imitation. Thorpe (1963) used the term copying as a discrete action verb. However, for Miller and Dollard, copying is a process roughly equivalent to the contemporary behavior analytic concept of shaping. Like matched-dependent imitation, copying requires reinforcement of imitative responses, in this case responses that are increasingly more similar topographically to the

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[2] Miller and Dollard used the term "reward" rather than reinforcement. However, in this case, their reward concept is functionally identical to the behavior-analytic term "reinforcement."

modeled response. The process may be directed by an agent who determines the "sameness" of the copier's response to that of the model's and delivers the reinforcers accordingly. However, the copier may also carry out the process and provide self-reinforcement. Here, as in matched-dependent imitation, the copier must respond to cues from the behavior of a model, but must additionally judge the "sameness" of his/her response to that of the model. That is, the copier must respond to cues of "sameness" produced by his/her actions in assessing how precisely he/she has matched the modeled behavior. For example, when attempting to improve language pronunciation using audio cassette instruction, a student may repeat an exercise several times. In doing so, the student responds to the verbal cues provided by the recorded model and to the sound of his/her own pronunciation. In this way the student uses information about how closely his/her pronunciation approximates that of the model's to regulate his/her practice.

Two distinctions can be drawn between shaping and copying. First, copying emphasizes the reinforcing agency's ability to respond to "sameness" cues. In shaping, the discrimination of 'sameness' is assumed and the emphasis is instead on the reinforcement of successive approximations to the target (in this case the model's) behavior. Second, copying requires a modeled behavior, while shaping may occur without the benefit of modeling.

Gewirtz (1969; Gewirtz & Stingle, 1968) suggested that imitation may be an outcome of shaping with reinforcement. Gewirtz argued that imitation is merely an operant response that, like all others, is maintained by environmental contingencies. Other operant-learning accounts of imitation have been proposed. Skinner (1953, pg. 120) described imitation as an operant response that is brought about by "discriminative reinforcement" contingencies. Any imitative response, according to Skinner, is part of a three-term contingency. Under this conceptualization, a modeled response functions as the discriminative event that occasions the imitative response, which is in turn maintained by reinforcement. From a behavior-analytic standpoint, either process, shaping or discriminative control and reinforcement, can account for the acquisition and maintenance of imitative behaviors. In short, imitation may be acquired and maintained by any of the same conditioning processes that control other operants.

Nevertheless, imitation is typically accorded special status by non-conditioning theorists. Non-conditioning explanations of imitation have been popular and extensively investigated. One reason for this may be that researchers have found it difficult, if not impossible, to account for operant-learning processes in natural settings. Processes such as shaping may occur very gradually over extended periods of time and reinforcement contingencies may not be apparent. One of the theses of this paper is that the same may be true of a variety of behavioral phenomena discussed below. These phenomena are considered vicarious by some, accompanied by little or no effort to identify controlling environmental stimuli that may be operating.

Identification and Generalized Imitation

The concept of identification arises from Freud's (1920, 1933) personality theory and overlaps that of imitation (Bandura, 1969; Gewirtz & Stingle, 1968). Identification has been indicated when the imitator matches, not necessarily specific responses of the model, but rather a general pattern of behaviors that is characteristic of that model. This includes behavior denoting the model's values, beliefs, role and ideals (Bandura & Houston, 1961; Gewirtz & Stingle, 1968). The object of identification is most commonly someone of high status for the imitator, such as parents (Bandura & Houston, 1961; Miller & Dollard, 1941). Identification has sometimes been conceptualized to involve various cognitive processes such as the intrinsic reinforcement value of likeness to the model (Kohlberg, 1963) or the formation of internal symbolic representations (Emmerich, 1959).

Bandura (1969) has suggested that identification phenomena can be accounted for by the process of incidental learning. Incidental learning refers to learning that occurs in the absence of direct tuition or contingencies (Catania, 1992, pg. 378). This level of explanation eliminates the need for superfluous cognitive concepts. However, the descriptive incidental learning notion fails to explain how non-reinforced behaviors may enter the individual's repertoire.

The concept of 'imitativeness' proposed by Miller and Dollard (1941) is useful in addressing this question. According to the Miller and Dollard four-factor theory of learning, repeated reinforcement of imitative behaviors results in the development of an 'imitativeness drive'. The concept of imitativeness moves in the direction of a more parsimonious, process explanation of identification because it does not include assumptions about cognitive processes that may be involved.

In general, imitativeness is consistent with behavior-analytic theory, except for the notion of an underlying imitative 'drive', which is gratuitous for behavior analysis. However, the process by which 'imitativeness' develops appears to be the same process as that involved in the formation of generalized imitation. Thus, in this case, the imitativeness 'drive' conception can be reconciled with behavior analysis.

From this perspective, imitative behaviors may come to function as a generalized matching-response class, not unlike other response classes (Baer & Deguchi, 1985; Gewirtz, 1969, 1971b; Gewirtz & Stingle, 1968; Kymissis & Poulson, 1990). The first instance of imitation may occur by chance or is brought about via processes such as shaping or fading (Gewirtz & Stingle, 1968). Early occurrences of imitation are then maintained by reinforcement contingencies. Several imitative responses may be established in this manner. Imitative responses that are functionally equivalent (i.e., result in the same consequence) come to function as a generalized response class. Thus, new imitative responses need only to be sufficiently similar to established responses in content, context, function or topography in order to be added to the response class (Baer & Deguchi, 1985; Gewirtz, 1969, 1971b; Poulson, Nunes & Warren, 1989). Likewise, not all imitative responses need to be individually reinforced. As long as some members of the matching-response class are reinforced intermittently, all of the responses in that class will be maintained.

For example, Poulson and Kymissis (1988) taught 10-month-old infants to imitate their mothers' manipulations of various toys. The mothers modeled 15 topographically distinct actions each involving a different toy. Imitation of 10 responses were reinforced with verbal praise; five probe responses were not reinforced. The results showed that the infants' imitation of non-reinforced responses increased concurrently with reinforced responses. Such generalized imitation effects have been reported by researchers who have used a variety of tasks, reinforcers and models (Baer, Peterson & Sherman, 1967; Baer & Sherman, 1964; Peterson & Whitehurst, 1971; Waxler & Yarrow, 1970).

The proposed behavior-analytic interpretation maintains that phenomena typically considered to denote identification are merely cases of generalized imitation. Matching broad patterns of behavior of a particular model may operate as a functional response class for the imitator's behavior in the manner described above. The imitator would then seem to 'identify' with the model.

Social Facilitation, Response Facilitation and Local Enhancement

Social facilitation generally refers to instances in which the performance of an instinctive behavior (also referred to as a fixed-action pattern) by one member of the species releases the same behavior in another (Catania, 1992; Thorpe, 1963). For example, when one bird takes flight this action releases the same behavior in most members of the flock. Thorpe refers to this as "contagious" behavior (1963, pg. 133). While such events may appear to be instances of imitation, they are generally regarded as attributable to innate mechanisms, rather than to learning processes. Therefore, these behaviors should not be considered to be vicarious.

The term social facilitation has been used differently in the social psychology literature. There, social facilitation is used to refer to the facilitative or enhancing effects on the behavior of another of the mere presence of an individual (e.g., Sanders, 1981). Again, no imitation is involved in such cases. Therefore, the vicarious notion should not be invoked.

However, Bandura (1977) has used the term social facilitation in yet a third manner. He defined social facilitation (which term Bandura has used interchangeably with "response facilitation") for contexts in which, "...the actions of others serve as social cues for eliciting preexisting behavior (pg. 49)." Bandura, however, does not limit these phenomena to instinctive behaviors. This usage is illustrative of the pervasive problem of overlapping concepts and loose terminology found within the literature on social behavior. The term social facilitation is used to denote three different processes. At the same time, two different labels, social facilitation and response facilitation, are used for potentially the same behavioral phenomena. Also problematic is Bandura's use of the words "cue" and "elicit." From a behavior-analytic perspective, "cue" and "elicit" denote different processes that cannot be mixed in the manner suggested by the above definition. A "cue" is a discriminative stimulus that occasions an operant response. The term "elicit" refers to a respondent relation between a stimulus and a response (Michael, 1993). Thus, a cue does not elicit a response, but evokes or occasions it. This example highlights the need for a common language among theorists and researchers of behavior, including those who are not identified with behavior analysis.

Local enhancement phenomena may also be mistaken for imitation. In the case of local enhancement, there is an increase in the likelihood that an individual will respond to an environmental stimulus as a result of observing another do so (Hinde, 1970 pg. 582). For example, one child playing with a toy may draw the attention of a second child to the toy. The second child would then likewise play with the toy. It is understandable that such instances may be easily misidentified as imitation. However, the key distinction between imitation and local enhancement rests in the stimuli that control the behavior. In the case of imitation, it is the model or his/her behavior that functions as the discriminative stimulus for the observer's matching behavior. Imitation may involve responses that are directed toward objects (e.g., throwing a ball), but often it does not. However, in the case of local enhancement, the observer's attention is directed, via the behaviors of the model, to relevant stimuli (Thorpe, 1941). The model's presence and even his/her behavior are incidental, save that they draw attention to an object or location. It is the object or location itself that controls the observer's behavior.

Vicarious Emotional Responding

Vicarious classical conditioning. Another area to which the vicarious notion has been attached is that of emotional responding in contexts involving stimulus conditions experienced by others. For example, in vicarious classical conditioning, a model's response may be classically conditioned to a particular stimulus while in the presence of an observer. On the basis of this observation, the same response by the observer would come under the control of the same conditioned stimuli which control the model's response (Bandura, 1969). However, it may be argued that the conditioning of the observer's behavior is not vicarious.

Apparent vicarious classical conditioning of an observer's behavior may occur on the basis of traditional classical conditioning processes such as second-order conditioning (Catania, 1992). For example, John's unconditioned response (UCR) of wincing when presented with an unconditioned stimulus (UCS), such as a mild electrical current, may be conditioned to occur in response to a tone via the standard classical conditioning process. This process may occur in the presence of an observer, Tim, who may then be seen likewise to wince when the tone is presented. However, the wincing response of others may have previously been established as a conditioned stimulus (CS) for Tim's wincing response. Therefore, the tone may function as a second-order conditioned stimulus (CS_2) for Tim's wincing response after several pairings with John's wincing behavior (CS_1).

The above example illustrates that vicarious notions of conditioning processes may be unnecessary. Instead, traditional conditioning concepts would likely explain such phenomena given a careful process-oriented investigation of stimulus-response relations.

Vicarious arousal and instigation. Emotional responding has also been studied under the heading of _vicarious arousal_. This is the case when, for example, an observer responds with fear when a tightrope walker nearly falls off the wire. Some researchers assert that the fear response of the observer is vicariously aroused by the near-fall experience of the performer (Bandura, 1965b, 1969). In the case of _vicarious instigation_, the observer would respond instead to the presumed, unconditioned emotional response of the performer, whether or not the performer actually emitted any emotional behavior (Berger, 1962; Green & Osborne, 1985).

In each of the three phenomena described above (vicarious classical conditioning, arousal and instigation), the vicarious label seems to be attached merely on the basis that the stimuli to which the observer responds include stimuli arising from the experiences or responses of others. However, the observed experience and emotional responses of others are not vicarious events for the observer. Non-behavioral theoretical explanations of so-called vicarious emotional phenomena give no attention to the conditioning history of the observer. Such considerations would likely reveal that direct conditioning processes can account for observer responding.

Implicit Reinforcement

Vicarious phenomena are also found under the heading of "implicit reinforcement" (Bandura, 1977). Sharpley (1985) used the term "implicit reward," rather than reinforcement, to reflect the putative nature of the reinforcer. Implicit reinforcement/reward should be distinguished from vicarious reinforcement. In the case of vicarious reinforcement, the observer does not perform the modeled response during the period of observation. However, in implicit reinforcement situations the observer of reinforcement of another's behavior is concurrently engaged in the same behavior. This scenario is common in settings where several individuals may be engaged simultaneously in the same activity. Often the behavior of some members of the group is reinforced, but not that of others. The behavior of one group member may be "implicitly" reinforced by observed reinforcement of others' behaviors, in lieu of direct reinforcement. However, Bandura (1971) points out that non-reinforcement of behaviors observed to be reinforced when performed by others may also function as punishment or extinction for the observer's behaviors. Thus, the term implicit reinforcement is loosely used to refer to processes that may result in either the increase or decrease in response rate.

The usual procedure for testing implicit reinforcement effects involves engaging subjects in a task, either in small groups or pairs, and selectively reinforcing the target behavior(s) of target subjects while monitoring the behavior of the entire group or pair. Implicit reinforcement procedures typically result in response change by both target subjects and nontarget peers. For example, in one study conducted in a second-grade classroom, the attending behavior of a target subject was reinforced, resulting in increased attending by both the target subject and a nontarget peer subjects (Broden, Bruce, Mitchell, Carter & Hall, 1970).

After a review of the literature, Sharpley (1985) concluded that reinforcers delivered to target subjects also functioned as reinforcers for the behavior of peers. However, the same caveats that have been suggested for non-behavior-analytic interpretations of other vicarious phenomena apply here. Most studies of implicit reinforcement/reward take place in classroom or classroom-like settings. Hence, children in these studies may have had an extensive history with intermittent reinforcement of select individuals' behaviors during group activities. Furthermore, they likely have experience both as one of the individuals selected for behavior reinforcement and as observers. On some occasions the child's behavior will have been reinforced following the observed reinforcement of a peer's response. Thus, it is reasonable to suggest that observed reinforcement of a classmate's behavior functions as a discriminative stimulus for the same behavior of peers. In fact, Sharpley (1985) found that the discriminative value of the implicit reward situation was significantly reduced when subjects were first exposed to a direct reinforcement condition. That is, when subjects experienced direct behavior-contingent reinforcement, they failed to show an increase in target responses during a subsequent implicit reinforcement condition. Differential responding as a result of temporal sequencing of conditions indicates that merely observing reinforcement of a classmate's behavior is not sufficient to control responding by peers. A functional analysis of the implicit reward situation would be useful to educators, and others who work with groups, by identifying better behavior-controlling variables in these settings.

Observational Learning

One of the most widely studied vicarious phenomena is observational learning. According to Bandura's social learning theory, operant learning is an unduly cumbersome, and in many cases dangerous, means of response acquisition. Instead, most behaviors are more efficiently learned by observing others (Bandura, 1977; Kanfer, 1965). For instance, Frank does not need to get stung by a bee to learn that bees should be avoided. He can benefit from observing Tom have an unfortunate experience with a bee. For Bandura (1969), then, observational learning occurs in the absence both of overt responding by the observer during observation of the model and of reinforcement (of either the model's or observer's responses).

Bandura posits observational learning as a bifurcated process of response acquisition followed by a response production phase (Bandura, 1977). To him, cognitive mediating processes, involving attention and memory, allow for response acquisition in lieu of contingencies. The observer forms a cognitive representation of the modeled response, which may then be rehearsed mentally. Bandura assumes that this cognitive representation can later be used to guide the replication of the response by the observer during the production phase of the process (Bandura, 1977; Friedman, 1972). In the purest observational learning scenario, the response is reproduced after an unspecified time delay in the absence of the model. Proponents of this view argue that virtually all operantly learned behaviors can also be acquired via observation. Moreover, Bandura (1977) states that novel responses can be acquired this way.

The typical test of observational learning involves exposing subjects to either a live or video recording of a model performing target responses. The subject's ability to reproduce the target responses is later assessed. Numerous researchers have reported that, under these conditions, subjects imitate modeled motoric responses and performance on concept transfer, paired- associate learning, verbal learning, memory, Piagetian conservation, and categorization tasks (Bandura, Grusec & Menlove, 1966; Bandura, Jeffery & Bachicha, 1974; Carroll & Bandura, 1982; Chalmers & Rosenbaum, 1974; Charbonneau, Robert, Bourasa & Gladu-Bissonnette, 1976; Erbaugh, 1985; Greeson, 1984; McCullagh, 1986; Michael & Maccoby, 1953; Ohnogi, 1985, 1986; Robert & Fortin, 1983; Vitaro & Robert, 1987; Westman & Westman, 1977). These studies typically emphasize the mediational processes purported to be involved in observational learning, rather than possible extrinsic variables.

For example, Bandura, Grusec and Menlove (1966) showed 6- to 8-year-old children a film of a model performing a "novel" sequence of behaviors. The children were assigned to one of three acquisition conditions: 1) facilitative symbolization, in which they were instructed to verbalize the actions of the model during the modeling phase, 2) passive observation, in which the children were directed to attend closely to the presentation, or 3) competing symbolization in which they were instructed to count while watching the presentation. During the subsequent performance test, the children were asked to perform the modeled behaviors. The results showed significant group differences in the mean percent of imitative responses. The facilitative symbolization group had the highest mean imitation score followed by the passive observation group. The authors concluded that verbalizations can facilitate observational learning by enhancing the mediating and representational processes involved in response acquisition.

This study is typical of research procedures that have been used to study observational learning. However, several limitations bring into question the authors' conclusions. First, the authors purported to study the acquisition of a novel <u>sequence</u> of behavior. In fact, subjects were tested for their ability to reproduce discrete behaviors, not a sequence. Thus, it is not clear that the subjects acquired any novel response, or response pattern, since the behaviors themselves were likely in the repertoire of most subjects at the outset (although base levels of the responses were not assessed). Second, the discrete behaviors that were tested were prompted by the researchers with cues designed to focus the recall of subjects on specific segments of the film. Third, the subjects in this study were six to eight years of age. The role of experience in similar situations cannot be overlooked. Young children are often called upon to "do as I do," and matching behavior is often reinforced. Finally, the percentage of modeled responses that were reproduced by the subjects, across all conditions was very low, from 17.5 to 6.0. While inferential statistical comparisons of group differences reached significance, no analyses were reported as evidence of learning. For instance, the researchers did not show an increase in response rates relative to base rates of the target behaviors. In the absence of such evidence, group comparisons may be inappropriate.

In short, the conclusion of Bandura, Grusec and Menlove (1966) that mediational and representational processes were involved in controlling behavior was unwarranted. Though such processes may always be involved in operant contexts, they do not rule out operant control of responding under the specified conditions of the study. A more stringent test of observational learning would include determining that the critical response is not in the subject's repertoire prior to the acquisition phase. In cases where the learning of a sequence of responses is of interest, a production test for the sequence, not individual components, is necessary. To the extent that such experimental controls have not been widely implemented, it is not possible to rule out operant processes as the basis of observational learning.

While, as argued by Bandura (1969), the three-term contingency paradigm ($S^D \rightarrow R \rightarrow S^R$) cannot account for the acquisition of novel responses, the notion that diverse observational learning phenomena may be accounted for by a single process is simplistic. Other processes such as shaping, fading and stimulus or response generalization may be involved for organisms with extensive reinforcement histories. Alternatively, observational learning may be the outcome of various other operant processes such as learning-to-learn, matching-to-sample and generalized imitation (Gewirtz, 1971b; Gewirtz & Stingle, 1968; Baer & Sherman, 1964). Extensive research is needed to correct the methodological weaknesses of the studies cited and systematically to identify functional extrinsic variables that can account for observational-learning phenomena.

Most of the behavioral phenomena discussed above have been grouped historically under the rubric of 'vicarious.'

These include, identification, vicarious classical conditioning, vicarious arousal, vicarious instigation, implicit reinforcement and observational learning. It was noted that evidence for the existence of vicarious events is predicated on the organism's ability to emit matching behavior (i.e., imitate). Thus, imitation, while not itself a vicarious process, is intrinsically related to vicariousness. The term vicarious has been used in this paper, as defined by de Charms and Rosenbaum (1960), to refer to situations in which an observation of a model's behavior has affected the observer's behavior "as if" it had been the observer who performed the behavior. Unfortunately, the stimulus contexts and operational definitions distinguishing one type of vicarious event from another often have been unclear in the literature.

To summarize, the purpose of this chapter was two-fold. First, an effort was made to define clearly, delineate and explain phenomena to which 'vicarious' labels have been applied. A distinction was also drawn between social facilitation and local enhancement, which may appear to fit the vicarious model, but in fact do not since their root mechanism is not imitation. Second, the vicarious concepts discussed were interpreted from a behavior-analytic perspective. The assertion was made that vicarious conceptualizations may be abandoned altogether since the phenomena at issue may be adequately and parsimoniously explained by traditional operant processes.

Continuing with this theme, the remainder of this paper will focus on vicarious reinforcement. Chapter Three presents an in-depth analysis of the phenomena labeled by this term and, again, a behavior-analytic interpretation is offered. Chapter Four presents empirical support for the behavior-analytic view.

Chapter III

A Behavior-Analytic Account of Vicarious Reinforcement

Bandura (1971) defines vicarious reinforcement as "a change in behavior of observers as a function of witnessing the consequences accompanying the performance of others" (p. 230). This definition is ambiguous because it does not specify the direction of behavior change, nor the behavior of the observer that changes. Indeed, the term vicarious reinforcement has been used to denote instances of both observed punishment and reinforcement contingencies for modeled behaviors (Thelen & Rennie, 1972). Thus, vicarious reinforcement loosely includes phenomena also labeled as vicarious punishment and vicarious extinction. Vicarious punishment and extinction are distinguished from vicarious reinforcement in that the former two involve the observation of nominal positive punishment and negative punishment contingencies, respectively, that result in decreased responding. Vicarious reinforcement, of course, involves observation of nominal reinforcement contingencies that results in increased responding (Bandura, 1969). However, the three involve observation of contingencies for the behavior of a model and a subsequent change in the behavior of the observer "as if" the consequence had been experienced directly. Therefore, while the following discussion focuses on vicarious reinforcement, the issues presented likewise apply to vicarious punishment and extinction.

From a behavior-analytic perspective the utility of the term "vicarious reinforcement" is highly questionable. As indicated above, the term "vicarious reinforcement" is generally used to describe the case of antecedent stimuli "reinforcing" an observer's subsequent behavior (Bandura, 1969; Kanfer, 1965). In this sense, "vicarious reinforcement" is an impossibility (i.e., an oxymoron) according to operant-conditioning theory, a central postulate of which is that an extrinsic reinforcing stimulus must follow (i.e., be the direct consequence of) an actual response. Thus, stimuli preceding a response cannot function as reinforcers for that response. Nevertheless, antecedent stimuli may evoke (i.e., provide the occasion for the occurrence of) responses that follow them. Without benefit of a careful functional analysis it is possible to mistake evocation of a response for reinforcement of the same.

Phenomena typically described as instances of "vicarious reinforcement" clearly do occur. The literature shows that vicarious reinforcement procedures can facilitate imitative responding (Arenson, 1976; Bandura, 1965b; Bandura, Ross & Ross, 1963; Kanfer, 1965; Rice, 1976). However, these phenomena can be ordered parsimoniously and efficiently via conventional operant-learning processes. Non-conditioning concepts such as "vicarious" are not required and likely obscure the relationship between a response and its controlling environmental stimuli. "Vicarious reinforcement" may be explained by operant-learning mechanisms involving the direct relations of the individual's responses with antecedent and consequential stimuli (Gewirtz, 1971a).

Operant conditioning theorists, such as Gewirtz (1971a), analyze and explain behavior in terms of direct antecedent and consequent stimulus conditions. Under this approach, the three-term contingency, S^D-R->S^R is the basic unit of behavior change (Michael, 1993). The three-term contingency is comprised of an antecedent discriminative stimulus (S^D), that evokes, or sets the occasion for, the occurrence of a response (R). A discriminative stimulus is an initially neutral stimulus in the presence of which a response is, at least occasionally, reinforced. The repeated temporal contiguity between the neutral stimulus and reinforcement of the specific response results in the stimulus acquiring discriminative control of the response. Thus, the S^D will come to cue responses that are likely to be reinforced (S^R) in its presence (Michael, 1993). Stimuli can also acquire discriminative control of responses that are likely to be punished in their presences. In this case the presences of the S^D would result in response inhibition. Under this paradigm, the occurrence of a behavior is controlled by its antecedent and consequent stimulus conditions.

Under behavior analysis, observed nominal reinforcement of a model's behavior can function as an S^D that evokes observer behavior which is topographically similar to the model's. Any stimulus can function as a discriminative cue, provided it is reliably and systematically paired with reinforcement of a response or group of responses.

In the typical vicarious reinforcement scenario, the S^D may be the model's response, the consequence of the model's response, the reinforcer itself, the agent delivering the reinforcer, a contextual stimulus or any combination of these that can reliably predict reinforcement of specific observer responses. Thus, the observer's behavior is controlled by the observed event, in the context of the observer's conditioning history, not the consequence to the model's nominally-reinforced behavior per se. More importantly, the observed event is an antecedent stimulus that may evoke the response, not a consequent reinforcer or punisher of the observer's response.

The theoretical difference of interpretation between social- learning and operant-learning theories has generated conflicting conceptual writings and research over the past 35 years. The crux of this debate is whether consequences must be involved for change in behavior or whether, as proposed by Bandura (1965a), vicarious processes in lieu of consequences of behavior can affect that behavior. The following is a summary of the investigation and conceptualization of the phenomena organized under the rubric of vicarious reinforcement.

Studies of Vicarious Reinforcement

Numerous researchers have investigated the effects of observed behavioral consequence to a model on the behavior of the observer (i.e., vicarious reinforcement). The methodology employed has varied widely and includes single-subject and group-design procedures as well as a variety of tasks. The typical study of vicarious effects, however, involves, first, exposing an observer to a model's behavior that is nominally reinforced or punished. Then the observer's matching of the modeled behavior is assessed.

One of the early studies of vicarious reinforcement tested the effects of exposure to aggression on the imitative responses of nursery school children (Bandura, Ross & Ross, 1963). The subjects viewed a film of two male children that depicted either, 1) nominal 'Reinforcement' of aggressive behavior, 2) nominal 'Punishment' of the aggressive behavior or 3) 'No-aggression'. A fourth group of subjects viewed 'No Film'. All children were then tested in a similar room containing two five-foot high "Bobo" dolls. Imitative responses were measured with respect to aggression toward the Bobo dolls. The results showed that children who observed reinforcement of aggressive behavior, on average, imitated significantly more aggressive behaviors than children in the other three conditions. These results were later replicated by Bandura (1965) using a similar procedure.

The results of the studies of Bandura, Ross and Ross (1963) and of Bandura (1965) clearly indicated that modeled nominal reinforcement and punishment consequences can differentially influence the likelihood of imitative responses by an observer. The authors concluded that this phenomenon occurs on the basis of the observer's anticipated consequences for imitating. By implication, one might assume that the observer's behavior is controlled solely by current stimulus conditions. That is, observation of nominal reinforcement is sufficient to evoke imitation (and visa versa for punishment). This view is limited in that it neglects the role of the observer's learning history in similar stimulus contexts. The omission is common to studies of vicarious reinforcement.

Increased responding under vicarious reinforcement conditions was likewise reported by Dubner (1973). Fourth-grade females viewed a film depicting either 'Reinforcement' of a model's drawing behavior or 'No-Consequence' for drawing. A control group was not exposed to the model. Subjects in the 'Reinforcement' group subsequently drew more than those in the 'Control' group, but not more than in the

'No-Consequence' group. This suggests that, for subjects in the 'Reinforcement' and "No-consequence" group, the model's behavior functioned as a discriminative event for their matching responses. However, the role of relevant subject experience was not discussed.

Walters, Parke and Cane (1965) instructed preschool and first-grade boys not to touch an array of toys, then showed the subjects one of three films or 'No Film'. All films depicted a 6-year-old boy (in the same setting) disobeying the same instructions followed by 'Punishment', 'Reinforcement' or 'No Consequence' for disobeying. The subjects were then left alone in the room. The researchers measured the latency, frequency and duration of touching the prohibited toys. The 'Punishment' group disobeyed instructions significantly less often than the other three groups. These results indicated a unidirectional effect of observing modeled consequences. That is, observing models disobey instructions and experiencing nominal reinforcement or no consequence did not result in subjects in those conditions being more likely to disobey than did non-exposure to the model (no-film). However, observation of nominal punishment for disobeying instructions resulted in subjects being less likely to disobey than did non-exposure to the model.

Overall, the results obtained by Walters, Parke and Cane

(1965) suggest that the observed consequences of the model's behavior influenced the likelihood that observers would disobey instructions when confronted with a similar situation. In the above experiment, the observed consequences of the model's response in the film apparently functioned to evoke either matching or avoidant observer responses, depending on whether the models's responses were reinforced or punished in the film.

Levy, McClinton, Rabinowitz and Wolkin (1974) investigated the effects of vicarious reinforcement and punishment on the forced-choice responses of second-graders. Subjects observed nominal verbal reinforcement, neutral verbal statements, nominal verbal punishment or a combination of the above contingent upon a model's choice behavior across a series of 24 trials. Then subjects performed the task themselves. The subjects in the 'Vicarious Reinforcement' group imitated the model's responses on significantly more than 50 percent of trials, while those in the 'Vicarious Punishment' group did so on significantly less than 50 percent of the trials. This study appears to provide support for both vicarious reinforcement and vicarious punishment effects.

In a study by Arenson (1976), preschool subjects' behavior of inserting a stylus into a hole was nominally reinforced intermittently with candy preceded by the onset of a light ('Alone' group). Subjects in the 'Observation' group witnessed the same behavior contingencies when the task was performed by a model, and subjects in the 'Control' group had no exposure to the task prior to the test phase. During the subsequent test phase, subjects were told they would receive candy at the conclusion of the test for inserting the stylus in the correct one of two holes. Correct responses were signaled by the light. The 'Observation' group made more target responses than did subjects in the 'Alone' or 'Control' groups. The author concluded that vicarious reinforcement procedures can affect observer behavior and that stimuli can become conditioned reinforcers, in this case the green light, via vicarious conditioning processes.

The behavior-analytic hypothesis that repeated observation of a model's behavior and its consequence functions as a discriminative stimulus for the observer's behavior does not readily explain Arenson's (1976) finding that subjects in the 'observation' condition performed better than those who received direct reinforcement ('alone' subjects). Under this hypothesis one would expect the performance of these two groups to be comparable. Thus, an additional factor beyond the effects of an S^D is suggested. The author proposed that subjects in the 'alone' condition may have been less "motivated" to perform during the test phase because they had already received a supply of candy during the prior conditioning phase. The author seems to suggest that the reinforcement value of the candy was diminished, via satiation, for children in the 'alone' condition. If so, one possible solution to this confound would have been to test subjects the following day rather than immediately after conditioning.

A second possibility is that observation of a model receiving candy contingent on a target behavior may function as an establishing operation, increasing the reinforcement value of the candy for the observer's same behavior. Subjects who repeatedly observed this event would then be likely to perform better on subsequent trials than subjects did not observe the event. However, in the above study, not only did subjects in the 'alone' condition receive candy prior to the test, they had previously performed the response several times. Thus, a third explanation is plausible; the insertion behavior of children in the 'alone' condition was subject to an habituation gradient.

Arenson's (1976) results illustrate the difficulty of drawing explanatory conclusions from findings when the design and methodology of the study have not exerted strong experimental control. A replication of this study that controls for the confounds between the 'alone' and the 'observation' conditions might help explain their differential effects. For example, a group that undergoes conditioning without candy reinforcers prior to testing might clarify if the performance of 'alone' subjects was due to satiation of the reinforcer or response habituation.

Consistent with previous studies, Rice (1976) found that preschool children were more likely to imitate observed nominally reinforced responses than observed nominally punished responses. Additionally, Rice (1976), tested Gewirtz's (1971a) assertion that vicarious reinforcement events are simply cases of conditional responding. Thus, such events could cue either imitative or non-imitative responding, depending on the child's training.

In the 'Natural' condition, imitation of nominally-reinforced model responses was reinforced and failure to imitate was punished, while non-imitation of nominally punished model responses was reinforced and imitation was punished. The opposite response-consequence relations were implemented for the 'Reverse' condition. Subjects in the 'Reverse' group required significantly more trials to learn to respond conditionally than did those in the 'Natural' condition, and fewer subjects in the 'Reverse' condition learned to discriminate than did those in the 'Natural' condition. Rice (1976) concluded that these results fail to support Gewirtz's conditioning view of vicarious reinforcement. However, her conclusion may have been premature.

These results may actually be consistent with Gewirtz's position. As Rice (1976) pointed out, the imitation-contingency relations of the 'Natural' condition were likely more common to children's experiences than those of the 'Reverse' condition. In other words the 'Natural' condition was more ecologically valid than the 'Reverse' condition. However, the conclusions of the author do not reflect this consideration. If the above assumption is true, group differences may have been amplified by the subjects' histories prior to entering the experiment. Specifically, learning was likely enhanced under the 'Natural' condition and inhibited under the 'Reverse' condition.

If the 'Reverse' condition depicts the opposite typical imitation-consequence relation, a longer latency to learn would be expected under this condition than under the 'natural' condition. Discriminative responding, in the previously conditioned natural manner, would first have to be extinguished then reestablished by the opposite stimulus conditions. Despite the complexity of the task, one quarter of the subjects under the 'reverse' condition reached the learning criterion (9 consecutive correct trials out of a block of 10) in the 90 trials allotted. This suggests that extended training might have diminished group differences.

In summary, the above studies show that, under certain conditions, observation of a model's behavior and its consequences can control the behavior of the observer (Arenson, 1976; Bandura, 1965; Bandura, Ross & Ross, 1963; Levy, McClinton, Rabinowitz & Wolkin, 1974; Rice, 1976; Walters, Parke & Cane, 1965). One may safely conclude that when the model's behavior is putatively reinforced, the observer is more likely to imitate the model than when the model's behavior is putatively punished or is not followed by a consequence. However, the assertion that the mechanism of behavior control was of a vicarious nature is questionable, theoretically as well as empirically. In contradiction to the homogeneous results discussed above, several researchers have shown decrements in mean responding under vicarious reinforcement conditions.

Bol and Steinhauer (1990) presented 24 same-sex pairs of preschool subjects with a puzzle task. Correct placement of puzzle pieces was putatively reinforced either for both subjects, neither subject or, in the 'Vicarious' group, for only one subject of the pair. Subjects in the 'Vicarious' and 'No' reinforcement groups made fewer correct responses than did those in the 'Direct' reinforcement group. 'Vicarious' reinforcement also resulted in more verbal aggression, complaints and attention-getting statements than did 'Direct' reinforcement, which resulted in more statements of approval, about the simplicity of the task, empathy and competition. The authors concluded that vicarious reinforcement conditions in which observer responses, similar to those of the model, are not reinforced directly function to extinguish those observer responses.

The results of this study support the behavior-analytic hypothesis that phenomena characterized by social-learning theorists as "vicarious" are in fact maintained by direct contingencies. If vicarious effects require direct contingencies for their maintenance, it is likely that they are also established by direct contingencies. However, this conclusion cannot be drawn directly from the results of Bol and Steinhauer (1990) since their study did not control for the subjects' reinforcement history in similar situations.

In a study by Deguchi, Fujita and Sato (1988), six children practiced pressing buttons on a control panel across a series of reinforced trials. Subjects then viewed a film of a model child pressing buttons on the same control panel and pressed the buttons themselves under varying conditions. Under 'Vicarious Reinforcement' (VR) only the model's responses were reinforced with tokens. Under 'Direct Reinforcement' (DR) the model's and the subject's matching responses were reinforced with tokens. Under the 'Simple Modeling' (SM) condition neither the model nor subject receive tokens until the conclusion of the session, and in the 'No Token' (NT) condition neither the model's nor the subject's responses were reinforced.

Imitative responds under the VR condition were initially high, but rapidly decreased and occurred less than under the SM and DR conditions. DR produced consistently high levels of imitation, and SM produced sustained high levels of imitation that eventually decreased for two subjects, but were maintained for another two subjects. The effects of SM may have been confounded by the effects of the reinforced practice trials that subjects experienced prior to commencing the experimental trials. Since all subjects received reinforced practice trials, later performance under SM may have reflected slower extinction of the response, rather than effects of modeling. Unfortunately, the authors did not include a control 'no modeling or token' condition to rule out this possibility. Deguchi, Fujita and Sato (1988) concluded that vicarious reinforcement should be conceptualized as a discriminative stimulus that controls behavior as a result of a history of direct reinforcement.

The results of this study again show that vicarious reinforcement in the absence of direct reinforcement ultimately produces extinction of the observer's matching response. Additionally, a post hoc hypothesis is suggested. The data from the SM and DR conditions indicated that observers were more likely to imitate under congruent model-observer treatments than under incongruent treatments. That is, when model and observer behavior consequence were congruent, both reinforced and neither reinforced, observers imitated more than when the consequences were incongruent, as in the VR condition. (Data obtained from the NT condition suggest likewise; however, their utility is limited since only one subject was exposed to this treatment for only one phase.) Thus, it is not the mere presence or absence of putative reinforcement that determines imitation of a model, but also the congruence between observed and experienced consequences for the behavior. Empirical tests of this hypothesis would likely reveal that discriminative control of modeled consequences are diminished under incongruent conditions. In the above study, incongruent conditions resulted in decreased imitation.

Ollendick, Daily and Shapiro (1983) also compared the effects of direct (DR) and vicarious reinforcement (VR) among preschoolers. Same-sex pairs performed a puzzle-completion task. One subject received continuous reinforcement (CRF) for correct puzzle completion while the other subject (observer) received no reinforcement. Correct placement of puzzle pieces increased for subjects in the CRF group. The VR group initially performed comparably to the CRF group, but subsequently showed decreased responding.

Consistent with previous studies, the vicarious reinforcement condition resulted in extinction of the observers' matching behaviors. While not systematically measured, subjects who experienced vicarious reinforcement verbalized statements such as "Come on, I can do them too," "Look at me too," and "I quit." This anecdotal evidence is consistent with the Bol and Steinhauer (1990) results which suggested that vicarious reinforcement was aversive to subjects.

The Ollendick, Dailey and Shapiro (1983) results were replicated by Ollendick and Shapiro (1984) with first- through sixth-grade children. Pairs of same-sex, same-grade children performed the digit symbol sub-test of the Wechsler Intelligence Scale for Children-Revised (see Seashore, Westman, & Doppelt, 1950). At the end of each trial, one child received social praise for performance (DR), while the other did not (VR). In a Control group, neither child received praise. Overall, VR resulted in fewer mean correct responses than either the DR or Control Conditions. The VR condition was also associated with a greater mean number of "affective responses" (e.g., complaints about not receiving praise) than DR or control conditions. Again, it may be concluded that the vicarious reinforcement condition, in the absence of directed reinforcement, hindered performance and increase subjects' verbalizations suggesting that the condition was aversive.

Studies showing decrements in responding under vicarious- reinforcement conditions clearly suggest that observation of a model's reinforced behavior is not sufficient to maintain imitative responding in young children (Bol & Steinhauer, 1990; Deguchi, Fujita & Sato, 1988; Ollendick, Daily & Shapiro, 1983; Ollendick & Shapiro, 1984). The matching response must be directly reinforced, at least occasionally; if not, the matching response will extinguish. These studies support the hypothesis that the role of historical and contextual variables must be included in a functional analysis of "vicarious" phenomena. Factors that should be considered part of such an analysis include the reinforcement history of the same (or similar) observer responses, the reinforcement history of imitative responses in general and the history with the reinforcer itself.

Nevertheless, there is well-established contradictory evidence that vicarious reinforcement can lead to response increases (Arenson, 1976; Bandura, 1965; Bandura, Ross & Ross, 1963; Dubner, 1973; Levy, McClinton, Rabinowitz & Wolkin, 1974; Rice, 1976; Walters, Parke & Cane, 1965). Such incompatible findings should not be regarded as reflecting that the behavioral phenomena under study are of a transient nature. It is important, instead, to identify the stimulus conditions that may lead to response increase versus decrease. The conflicting results of researchers showing response increases under vicarious reinforcement conditions versus those showing response decreases may be accounted for by the systematic procedural differences noted between the two groups of studies.

Studies that have demonstrated response increases under vicarious-reinforcement conditions have implemented observation and performance phases sequentially (Arenson, 1976; Bandura, 1965; Bandura, Ross & Ross, 1963; Dubner, 1973; Levy, McClinton, Rabinowitz & Wolkin, 1974; Rice, 1976; Walters, Parke & Cane, 1965). The subjects in these studies first observed modeled contingencies, then were tested for imitation. These studies essentially employed a one-trial procedure. However, studies reporting response decreases under vicarious reinforcement conditions have used either a multiple-trials procedures in which the model and subject take turns making choice responses (Deguchi, Fujita & Sato, 1988) or a concurrent procedure in which subject pairs were concurrently engaged in the designated task (Bol & Steinhauer, 1990; Ollendick, Dailey & Shapiro, 1983; Ollendick & Shapiro, 1984). A second systematic difference arising out of one-trial sequential versus multiple-trial and concurrent procedures is that in the former procedures subjects experience no consequence for either imitating or failing to imitate. However, in multiple-trial and concurrent procedures the subject's responding is placed on an "extinction" schedule during vicarious reinforcement conditions, insofar as only the model's behavior is reinforced.

The question of how such procedural differences lead systematically to opposite effects is one that has yet to be addressed empirically. However, in keeping with behavior-analytic conceptions, the following hypothesis is offered. It may be assumed reasonably that subjects enter an experiment with a history of reinforcement for imitative behaviors. Moreover, a subject's imitative behavior may have frequently been reinforced following observed putative reinforcement of the same behavior by a peer. Repeated exposure to this scenario would be sufficient to establish the reinforcement of peer behavior as an effective S^D for the observer (the inverse would be true for observed punishment).

Given this assumption, one-trail sequential procedures may not significantly reduce the discriminative function of the observed nominal reinforcement, while multiple-trials and concurrent procedures result in just that. That is, over multiple trails (or during concurrent model-observer responding conditions) in which observation of reinforcement (i.e., the S^D) fails to occasion reinforcement for the subject's imitative responses, the S^D ceases to function as such and the imitative responding is extinguished.

This hypothesis is supported by the results of studies showing an initial increase followed by a significant decrease in target responding under multiple-trial or concurrent performance vicarious-reinforcement conditions (Deguchi, Fujita & Sato, 1988; Ollendick, Daily & Shapiro, 1983). Empirical tests of this hypothesis would contribute to an integrated understanding of behavior under various discriminative conditions historically labeled "vicarious." Furthermore, such tests would likely help resolve the dispute between the social-learning and the operant-conditioning theories of vicarious reinforcement.

In summary, the phenomenon of "vicarious reinforcement" among young children is robustly established (Arenson, 1976; Levy, McClinton, Rabinowitz & Wolkin, 1974; Walters, Parke & Cane, 1965). However, there is equally strong evidence that, under certain conditions, vicarious reinforcement results in response reduction rather than increase (Bol & Steinhauer, 1990; Deguchi, Fujita & Sato, 1988; Ollendick, Dailey & Shapiro, 1983; Ollendick & Shapiro, 1984). Procedural differences have been cited as possible determinants of contradictory effects.

However, each of the studies surveyed shares a critical methodological weakness. Researchers have failed to control for their observer subjects' histories of direct, if intermittent, reinforcement contingencies in situations similar to the researchers' testing procedure. The present experiment investigated the role of earlier direct-contingency learning on a subsequent vicarious-reinforcement-type task.

Experiment 1 was designed to replicate positive vicarious reinforcement effects reported by others (e.g., Bandura, Ross & Ross, 1963; Dubner 1973; Levy, McClinton, Rabinowitz & Wolkin, 1974; Walters, Parke & Cane, 1965). It was hypothesized that, in the absence of direct positive reinforcement in the testing situation, children would tend to imitate a model's behavior only when the mode's behavior was putatively reinforced. However, this imitation is believed to occur as a result of a history of reinforcement for imitative behaviors in general, and not to be due to vicarious reinforcement.

Experiment 2 investigated the role of prior learning on subjects' performance in a vicarious-reinforcement situation. It was predicted that preschool children would imitate a model's observed reinforced responses when the observer had likewise experienced reinforcement of the same response, but not when the observer had experienced punishment of that response. That is, observation of reinforcement of a model's behavior should function as a discriminative stimulus only for subjects who had experienced reinforcement of the same behavior.

Chapter IV

Method

Experiment 1

Subjects. Subjects were 32 2.83- to 5.83-year-old children (M = 4.44, SD = 0.80), 17 males and 15 females, who were recruited from 10 preschools in the greater Miami, Florida area. Information and consent forms were distributed to parents by school officials. The sample was drawn from those children whose parents returned signed forms. There were no other criteria for inclusion in the study. The ethnic composition of the final sample consisted of 1 Indian, 3 Black, 15 White non-hispanic, and 13 Hispanic children.

Subjects were tested in same-sex pairs (except for two pairs). Because testing was restricted by the availability of subjects, assignment of same-sex subjects to pairs could not be conducted randomly. Instead, each testing day classroom teachers were given a list of students to be tested from her class. Teachers designated which students could be removed from the class and when, depending on the scheduled classroom activities. Thus, subject pairs were determined by the first two available same-sex children.

Subjects were also matched on years of age and classroom to the extent possible. The average age difference between partners was 3.84 months (SD = 3.36 mo.). Age differences ranged from 0 (N= 1) to 12 months (N = 1), with only four pairs exceeding an age difference of six months. All but one pair of subjects shared a classroom.

Stimuli and Setting

The stimuli were four 3 in. x 5 in. irregular, novel shapes cut out of paper (see Figure 1). There were 5 green and 5 yellow reproductions of each shape, totalling 40 stimuli. These were combined into 20 stimulus pairs. Each pair consisted of two different shapes, one green and one yellow. A red three-ring binder containing 20 laminated photo-album pages was used to present the stimuli. The stimuli were arranged such that, as the pages were turned, one of the two facing pages was blank. Thus, on each trial, only one stimulus pair was in view at one time. The orientation of the shapes on the page were rotated approximately 180 degrees on some of the trials. The lateral positions of the stimuli were quasi-randomly determined with the condition that the same color or shape not appear on the same side of the page on more than two consecutive trials.

Two identical stimulus binders were used. A scoring sheet was used to record the subject's response on each trial (See Appendix). The sheet was kept at the back of the binder, out of view of the subject, during the procedure.

Subjects were tested in school areas designated by school directors. The areas were generally quiet and free from distractions. At the conclusion of the session, subjects were given their choice from a variety of stickers.

Design

Two independent variables were manipulated in a 2 (Treatments) X 2 (Phases) repeated-measures mixed design. The procedure consisted of three phases: 1) Baseline (A), 2) Conditioning (B) or Observation (C), and 3) Test (A -- i.e., return to the baseline condition). Both members of each pair underwent the Baseline and Test phases (within-subjects repeated measures). One member of each pair underwent the Conditioning (N = 16) treatment and the other underwent the Observation treatment (N = 16). Thus, subjects in Conditioning treatment experienced Baseline, Conditioning and Test (ABA) while those in the Observation treatment experienced Baseline, Observation and Test (ACA).

The Conditioning and Observation Phases were not included as levels of the independent variable Phase because these two treatments were not comparable. Specifically, subjects in the Observation treatment could not respond during that phase of the procedure, as they were passively observing, while subjects in the Conditioning treatment of course did respond. Also, subjects in the Conditioning treatment, and their partners, were required to meet a learning criterion (described below) in order to be included in the final sample. Thus, performance during the

Conditioning phase was not free to vary.

Subject pairs were assigned either the Green or Yellow stimuli as targets. The Green stimuli were the target for seven subject pairs in each Treatment and the Yellow stimuli were the target for nine subject pairs in each Treatment. The procedure for assignment of target color is described below.

Procedure

Subject pairs were accompanied to the testing area by two adult-female experimenters. Upon entering the room both subjects were instructed by an experimenter as follows:

> "We are going to play a game. If you win, you get a sticker. Pick the sticker that you want to win."

Each subject then selected a sticker and the experimenter continued:

> "I'm going to put your stickers away until after the game. Remember, you get to keep the sticker if you win."

Each subject was then seated with an experimenter. The experimenters began the procedure simultaneously for both subjects.

Baseline (A). The purpose of the baseline phase was to assess initial preferences for each stimulus color in order to determine assignment of pairs to target colors. Subjects were seated back-to-back and as far apart as possible so that they could not see each other, in order to minimize distraction. At the start of the baseline phase the experimenters instructed the subjects as follows:

> "We are going to play the game now. I'm going to show you two things at a time. All you have to do to win the game is pick the best one by pointing at it. If you pick the best one enough times you win the game and get the sticker. Do you understand?"

If the subject indicated that he/she did not understand, the experimenter repeated and clarified the instructions. If the subject responded affirmatively, the experimenter proceeded.

> "Before we play the game, let's do it once just for practice."

Each subject was, concurrently, then given 20 Baseline trials. Each trial began with the presentation of a stimulus pair and the instruction to "Pick the best one." A trial ended when the subject pointed to one of the two stimuli. The color selected on each trial was recorded. The experimenters maintained a neutral expression throughout the baseline phase, provided no feedback and made no eye contact with the subjects.

Target colors were assigned immediately following Baseline. The experimenters asked the subjects to wait for one moment while they conferred. The procedure for assigning target colors was designed to minimize the effects of initial color preferences on test performance and to show the maximum magnitude of response change from Baseline to the Conditioning and Test phases. Thus, subjects were assigned as their Target Color the color that was least preferred during baseline.

A color preference was defined as selecting the same color on at least 11 of the 20 trials (55 %). The Target Color assignment procedure was as follows. If neither subject in a pair showed a color preference, either target color was assigned. (However, this was not the case for any subject pairs in Experiment 1.) If only one member of a pair had a color preference, the pair was assigned the color least preferred by that subject (N = 6 pairs). If both subjects had the same color preference, the pair was assigned the opposite target color (N = 5 pairs). For cases in which the members of a pair showed opposite color preferences, the pair was reserved to serve as subjects in Experiment 2 (see Table 1).

This procedure was followed to the extent possible. However, it was necessary to make exceptions in order to fill the final treatment cells. Thus, in situations in which one (N = 4 pairs) or both (N = 1 pair) members of a pair showed a preference, and it was not possible to run the pair in Experiment 2, the color least preferred by the two subjects was assigned as the target color. This resulted in six of the 32 subjects having baseline target preferences above 50 percent. Following assignment of target colors one subject was assigned to the Conditioning treatment and the other to the Observation treatment.

Conditioning (B) and Observation (C). As one member of the pair was going through the Conditioning phase, the other was observing. The purpose of the Conditioning phase was to condition the subject's response of choosing the target color and to expose the 'Observing' subject to reinforcement of the 'Conditioning' subject's target response.

The subjects were seated side-by-side and the experimenter presenting the stimuli sat directly in front of the 'Conditioning' subject. The second experimenter sat beside the 'Observing' subject to ensure that he/she attended to the game. If the 'Observing' subject looked away from the task or spoke, the second experimenter got the 'Observing' subject's attention by tapping his/her shoulder and whispered "pay attention" or gestured "be quiet." Before commencing, both subjects were instructed as follows:

> "O.K., that was just practice. Now let's play the game for real. [Name of Conditioning subject], you get to go first and [name of observing subject] you get to watch, later you will get to play. The rules of the game are that you cannot talk. Both of you must pay very close attention. [Name of Conditioning subject] pick the best

one by pointing to it [Name of observing subject] watch [name of Conditioning subject] very carefully."

Each of 40 trials began with the same prompt, to "Pick the best one." Target responses were followed immediately with verbal praise such as, "That's right." "Good choice, that one is best." and "Yes, that's the right one." The experimenter verbalized the praise in a very happy tone of voice (i.e., high pitch and volume) while looking and smiling at the child. Non-target responses were followed by putative verbal punishment in the form of, "No, that's wrong." and "Sorry, that's not the best one." The experimenter maintained a sad face and voice (i.e., low pitch and volume) on punishment trials. Color choice was recorded on each trial.

Subjects in the Conditioning treatment were required to meet a 75 percent learning criterion. That is, the subjects were required to choose the target color on 30 of the 40 conditioning trials, including on the last five trials. Three subjects, and their partners, who failed to meet this criterion were dropped from the sample. The purpose of this criterion was to ensure that subjects in the Conditioning treatment learned to emit the target response and to give subjects in the Observation treatment ample exposure to the reinforced responses of their partners. This criterion was expected to optimize the effects of both the direct reinforcement (conditioning) and the observation of reinforcement on performance during the test phase, and to eliminate possible effects of non-random assignment of subjects to groups.

<u>Test (A)</u> - The Test phase was run concurrently for both subjects and exactly as the Baseline phase. Both subjects were seated at their original position with the same experimenter as during Baseline. The subject in the Conditioning treatment was told:

> "You're doing a good job. Let's do it one more time to see if you can win the sticker. This time I'm not going to tell you if you choose the right one or not. I'm going to be quiet, but I want you to still pick the best one."

The subject in the Observation treatment was told:

> "Now it's your turn to play the game. I'm not going to tell you if you pick the right one, but I want you to pick the best one so you can win the sticker."

Each subject was then given 20 test trials. Experimenters again maintained a neutral face and provided no feedback or eye contact. The dependent measure was the proportion of target responses. For subjects in the Observation treatment, target responses represented imitative responses.

<u>Results</u>

Proportion of target response scores were calculated for the Baseline phase (Baseline Target Proportion [BTP]) and Test phase (Test Target Proportion [TTP]) by dividing the number of target responses by the total number of trials (20). These scores were analyzed using a 2 (Treatments, Conditioning and Observation) X 2 (Phases, Baseline and Test) repeated measures, within- and between-subjects ANOVA. The same analysis using arcsine transformations of the proportion data yielded the same conclusions. Therefore, only the results of the proportion data are reported.

Both Treatment groups were predicted to show an increase in target-response means from Baseline to Test phase. Therefore, a main effect of Phase was expected. Neither a main effect of Treatment nor Treatment X Phase interaction effect was expected. The hypotheses were supported by the ANOVA results. Inspection of group means, in Table 2, shows increased target-responding means across Phases ($F_{1,30}$ = 71.44, $p < .001$) for both Treatments. There was no significant Treatment ($F_{1,30}$ = 0.27, $p > .10$) or Treatment X Phase interaction effect ($F_{1,30}$ = 0.65, $p > .10$).

Secondary analyses were conducted to ensure homogeneity of Treatment groups on baseline performance. A two-sample t-test revealed no significant difference between the Conditioning and Observation treatment on mean BTP scores (t_{30} = 0.19, $p > .10$). Analyses were also conducted to assess for sex differences and differences on test performance due to Target Color. There was no significant difference between females (N = 15) and males (N = 17) as indicated by a 2 (Sex) X 2 (Phase) repeated measures ANOVA on proportion of target responding across Baseline and Test phases ($F_{1,30} = 0.73$, $p > .10$).

A two-sample t-test on TTP scores by Target Color was used to determine the effect of Target Color on performance during the Test phase. This t-test revealed a significant difference between the group of subjects who were assigned the Green (N = 14, $M = .729$, SD = .272) stimuli and the group assigned the Yellow (N = 18, $M = .906$, SD = .159) stimuli as targets ($t_{30} = 2.30$, $p < .05$). However, since the variable Target Color was crossed with the variable Treatments, the significant Target Color effect is unlikely to qualify the primary findings. This conclusion is supported by the finding that mean TTP scores were significantly above chance (i.e., 50%) for both the Conditioning ($t_{15} = 7.723$, $p < .01$) and Observation ($t_{15} = 4.388$, $p < .05$) treatment groups, regardless of Target Color.

Conclusions

The results of Experiment 1 are consistent with those of vicarious reinforcement studies that have reported positive effects (Bandura, Ross & Ross, 1963; Dubner 1973; Levy, McClinton, Rabinowitz & Wolkin, 1974; Walters, Parke & Cane, 1965). Consistent with the cited studies, a sequential procedure was used in which subjects in the Observation treatment first observed their partner "play the game" and then were tested. However, the design of Experiment 1 improved upon those of previous studies by adding a baseline phase. This allowed for the control of initial levels of the target response in two manners. First, baseline assessments allowed experimenters to assign the non-preferred color as the target. This ensured that a high level of target responses on the test phase was due to the intervening treatment phase, and not to initial preferences. Second, it was possible to include the variance due to base levels of the dependent variable in the statistical analyses. That is, the performance of subjects on the test phase was assessed relative to their baseline level of responding using a repeated-measures ANOVA.

As discussed above, it was assumed that imitation in this testing situation could be a function of the child's learning history. Thus, observed reinforcement of a model's behavior should function as a discriminative stimulus for the matching response of the observer. Unfortunately, this assumption is difficult, if not impossible, to test directly since the experimenter cannot control the subject's learning history prior to the experiment. However, within the context of the experiment, it is possible to contrive an immediately-earlier history of reinforcement or punishment for target responses. This recent history would be superimposed, if temporarily, on the subject's history of learning prior to entering the experiment. That is, subjects could learn to discriminate contingencies in the context of the experimental setting that may not have been in place on previous settings. This approach was used in Experiment 2 in order to show that imitation under vicarious reinforcement conditions may be controlled by the subject's prior experience with contingencies, not by the mere observation of a model's responses and its contingencies.

Experiment 2

Experiment 2 tested the hypothesis that modeled behavior that is observed to be reinforced would not function as a discriminative stimulus for matching observer behavior, if the observer did not likewise have a history of reinforcement of that behavior. Subjects learned to choose a target color and observed reinforcement of a peer's behavior of choosing either the same (Congruent treatment) or different (Incongruent treatment) color.

Subjects. Subjects were 48 3.00- to 5.75-year-old children (M = 4.49, SD = 0.66), 27 males and 25 females, who were recruited from 7 preschools in the greater Miami, Florida area. Information and consent forms were distributed to parents by school officials. The sample was drawn from those children whose parents returned signed forms. There were no other criteria for inclusion in the study. The ethnic composition of the final sample consisted of 2 Black, 28 White non-Hispanic and 18 Hispanic children.

Subjects were tested in same-sex pairs. The procedure for assignment of subjects to pairs was the same as in Experiment 1. Subjects were also matched on years of age and classroom to the extent possible. The average age difference between partners was 4.32 months (SD = 4.20 mo.). Age differences ranged from 0 (N = 4) to 15 months (N = 1), with six pairs exceeding an age difference of six months. Of the 24 pairs of subjects, 21 shared a classroom.

Stimuli and Setting. The stimuli were the same as those used in Experiment 1.

Design. Three independent variables were manipulated in a fully-counterbalanced 2 (Treatments) X 2 (Phases) X 2 (Treatment Orders) mixed design. The two levels of the between-subjects factor Treatments were Congruent (N = 24) and Incongruent (N = 24). In the Incongruent treatment one member of each pair was assigned the Green (N = 24) stimulus as the Target Color and the other member was assigned the Yellow (N = 24). In the Congruent treatment, both subjects in each pair were assigned the same Target Color (either Green or Yellow). Assignment of subject pairs to Treatments and of individual subjects to Target Color was not random, but was determined by performance during the Baseline phase. The Treatment and Target Color assignment procedure is described below. Table 4 depicts the complete design of Experiment 2.

Procedure

Experiment 2 consisted of the same three treatments as Experiment 1. However, in Experiment 2 the Conditioning and Observation treatments were within-subjects factors. Thus, all subjects went through four phases, Baseline (A_1), Conditioning (B), Observation (C) and Test (A_2). The Baseline phase was the first phase and the Test phase was the last for all subjects. Both subjects in each pair went through the Baseline and Test phases concurrently. The Treatment Order of Conditioning and Observation phases was counterbalanced within and across subject pairs. Thus, the Conditioning phase for each subject was simultaneously the Observation phase for his/her partner.

One subjects of each pair was assigned to the Conditioning-First (CF, N = 24) Treatment Order and the other to the Observation-First (OF, N = 24) Treatment Order. Subjects in the CF group experienced an ABCA phase order, while those in the OF group experienced an ACBA phase order (see Figure 2). The instructions given to the subjects were the same as those of Experiment 1. However, they were repeated when it was the second subject's turn to "play the game."

Assignment of subjects to Treatment Order, Treatment and Target Color was done immediately following baseline. Assignment of one subject to the CF Treatment Order resulted in the second subject automatically being assigned to the OF Treatment Order. The procedure for assignment of the pair to either the Congruent or Incongruent group and of individual subjects to a Target Color was as follows.

If neither subject in a pair showed a color preference during Baseline, the pair was assigned to either the Congruent or Incongruent treatment and the subjects were assigned either the Green or Yellow Target Color. If only one member of the pair showed a color preference, the pair was assigned to either treatment and the subject with the preference was assigned the non-preferred color. If both subjects had the same color preference, the pair was assigned to the Congruent treatment and assigned the non-preferred color as the target. If each subject had a preference for the opposite color as their partner, the pair was assigned to the Incongruent treatment, and subjects were assigned their non-preferred color. As in Experiment 1, this procedure was followed to the extent possible. However, as treatment cells were filled, deviation from the procedure was necessary. It was not possible to assign both members of a pair to their non-preferred color. Thus, five subjects had

Baseline scores above 50 percent.

The purpose of the Conditioning phase was to provide a history of reinforcement of the target response. Since performance on the test phase was hypothesized to be a function of learning, it was important to ensure that learning occurred during the Conditioning phase. Thus, a strict criterion of 75 percent target responding was imposed for the Conditioning phase. Fifteen pairs, for which one or both subject failed to meet this criterion, were dropped from the sample, eight from the Incongruent treatment and seven from the Congruent treatment. The learning criterion also eliminated possible effects that may have been due to possible non-random assignment of subjects to groups, because it ensured that all subjects learned to select their target color prior to the test phase.

<u>Results</u>

The proportion of target responses for individual subjects was calculated for Baseline (BTP) and Test (TTP) phases by dividing the number of target responses in each phase by the number of trials (20). A 2 X 2 X 2 repeated-measures ANOVA was run on Treatment (Congruent versus Incongruent) by Order (Conditioning First [CF] vs Observation First [OF]) with Phase (Baseline and Test) as the repeated factor. A significant effect of Phase was predicted. No significant Treatment, Order or interaction effect was expected.

The results supported the hypotheses advanced. There was found a significant main effect of Phase ($F_{1,44} = 69.15$, $p < .001$). There was found no significant effect of Treatment ($F_{1,44} = 0.59$, $p > .05$) or Order ($F_{1,44} = 2.29$, $p > .05$). There were also no significant two-way interactions. However, contrary to the predictions, a significant Treatment X Order X Phase interaction effect ($F_{1,44} = 6.71$, $p < .05$) was found.

In order to determine the nature of the reliable Treatment X Order X Phase interaction, the two-way interactions were further investigated. Repeated-measures ANOVAs were run separately on Phase X Treatment for the Conditioning-First and Observation-First groups and separately on Phase X Order for the Incongruent and Congruent treatment groups.

The Phase X Treatment ANOVA for the Conditioning-First group yielded a significant main effect of Phase ($F_{1,22} = 26.88$, $p < .001$) qualified by a significant Phase X Treatment interaction ($F_{1,22} = 6.65$, $p < .05$), but no significant effect of Treatment ($F_{1,22} = 2.04$, $p > .05$). The Phase X Treatment ANOVA for the Observation-First group yielded a significant main effect of Phase ($F_{1,22} = 46.58$, $p < .001$) and no significant Treatment ($F_{1,22} = 0.18$, $p > .05$) nor Phase X Treatment interaction ($F_{1,22} = 0.86$, $p > .05$). Thus, the levels of the variable Order (i.e., Conditioning-

First and Observation-First) differentially effect the outcomes of the variables Phase and Treatment.

The Phase X Order ANOVA for the Congruent treatment group revealed a significant main effect of Phase ($F_{1,22}$ = 42.17, $p < .001$). There was no significant main effect of Order nor Phase X Order interaction. The Phase X Order ANOVA for the Incongruent group yielded a significant main effects of Phase ($F_{1,22}$ = 27.13, $p < .001$), Order ($F_{1,22}$ = 4.03, p = .05) and a significant Phase X Order interaction ($F_{1,22}$ = 4.55, $p < .05$). Thus, the levels of Treatment (i.e., Congruent and Incongruent) differentially affected the outcomes of the variables Phase and Order and the two-way interaction of Phase X Order.

Interpreted collectively, the results of the above 2 X 2 ANOVAs indicate that the three-way interaction of the Phase X Treatment X Order ANOVA may be attributable to an interaction among all three independent variables. However, a conclusive explanation of the three-way interaction was not possible.

Additionally, all subjects were expected to show a high proportion of target responses during the test phase, regardless of their Treatment or Treatment Order status. Independent t-tests against a null hypothesis of 50 percent on mean TTP scores for each Treatment group supported the above hypothesis. Subjects in the Congruent (M = .871, SD

=.391, t_{23} = 4.64, $p <.05$) and Incongruent Treatments (M = .754, SD = .391, t_{23}= 4.64, $p < .05$) had TTP score means significantly above chance.

Secondary analyses were conducted to ensure that subjects in the Congruent and Incongruent treatments did not differ initially on baseline performance. A two-sample t-test revealed no significant difference in the mean proportion of target response during baseline (t_{46} = 0.48, $p > .10$). There was also no significant sex difference as indicated by a 2 (Sex) X 2 (Phase) repeated measures ANOVA on TTP score means across Baseline and Test ($F_{1,78}$ = 0.54, $p > .10$).

A two-sample t-test on TTP score means by Target Color revealed that subjects who were assigned the Yellow stimuli as targets (N = 26, M = .910, SD = .214) had a significantly higher mean proportion of target responses on the Test phase than those who were assigned the Green (N = 22, M = .698, SD = .424) stimuli as targets (t_{30} = 2.24, $p < .05$). However, this unexpected result is not believed to qualify any of the primary findings since, as noted above, subjects in both the Congruent and Incongruent treatments chose their target colors on significantly more than 50 percent of the test trials. Additionally, the factor Target Color was crossed in the experiment with the factors Treatment and Treatment Order.

Finally, in order to ensure that the subsample of subjects who failed to meet the learning criterion (and were thus dropped from the sample) did not differ initially from the final sample, a two-sample t-test was conducted on the mean BTP scores of the two groups. There was no significant difference found on the mean proportion of target responses during Baseline between the subsample of subjects who were dropped from the study (N = 30, $\underline{M}$ = .430, SD = .137) and the final sample (N = 48, $\underline{M}$ = .395, SD = .192, t_{46} = 0.875 $p >$ .10). Therefore, the two groups appeared to differ only with respect to their rate of learning. Because the main hypothesis of the study was that prior conditioning would determine performance on the test phase, the purpose of the learning criterion was to ensure conditioning of the target response. Thus, the generalizability of the overall results are not believed to be diminished by the exclusion of subjects who did not meet the criterion of learning. It is likely that subjects who were dropped from the sample on this basis would have met the learning criterion if given additional training and would have subsequently performed similarly to the final sample on the test phase.

Conclusions

The results of Experiment 2 supported the behavior-analytic theoretical position that imitation under vicarious-reinforcement conditions is a function of the observer's learning history. Subjects who had experienced behavior contingencies that were Congruent with those observed showed a high level of target responses on the subsequent test phase. In previous research, which did not include a direct Conditioning phase, such outcomes following observed reinforcement of the target response had been interpreted to result from vicarious reinforcement. However, the contrasting performances of the Congruent and the Incongruent treatment groups in this experiment suggest otherwise.

Subjects who had experienced behavior contingencies that were Incongruent with those observed likewise showed a high level of mean target response during the test phase. Consistent with the main hypothesis, observed behavior of a model and/or its reinforcement behavior did not function as a discriminative stimulus when the observer had a history of punishment, rather than reinforcement, for that response.

Chapter V

Discussion

A key feature of the behavior-analytic approach, vis-a-vis Bandura's social-learning theory, is that consequences can be linked directly not to the observer's behavior, but to the performer's behavior. Thus consequences can function as reinforcers only for performer behaviors. However, in social-learning theory, when the behavior of one individual is altered by the observation of consequences to another's behavior (in the absence of the observer's same behavior and its direct reinforcement), "vicarious reinforcement" has been said to have occurred (Bandura, 1977). Thus, social-learning theory maintains that simply observing consequences to the behavior of another can determine the behavior of the observer, in the same way as can direct contingencies for explicit behavior. However, the results of the present study did not support the social-learning conceptualization of so-called vicarious-reinforcement phenomena.

The main postulate of this paper has been that modeled behavior and its nominal reinforcement can function as a discriminative stimulus for an observer's matching responses, provided that the observer also has a history of reinforcement for the same or similar responses. With the exception of a study by Deguchi, Fujita and Sato (1988), previous researchers have generally failed to address the role of prior learning in this context.

In the present study, Experiment 1 supported the findings of earlier researchers espousing the social-learning conceptualization of vicarious reinforcement. The results showed that preschool children will imitate a peer's reinforced response. However, the sequential-phases procedure and between-subjects design used in Experiment 1, as in prior studies, was insufficient to account for the effect of the observers' learning history on this apparently-vicarious phenomenon.

Experiment 2 investigated the effects of prior learning in similar settings on the performance of subjects in a vicarious-reinforcement situation. Subjects were exposed to both direct reinforcement and observed reinforcement of target responses. The effects of vicarious reinforcement, had they existed, should have resulted in significantly decreased target responses for the Incongruent treatment group relative to the Congruent treatment group. However, the performance of the Incongruent and Congruent treatment groups did not differ significantly on the test phase, and both groups showed mean target-response proportions significantly above base levels. Thus, subjects in the Incongruent group, on average, did not imitate reinforced modeled responses. Instead, the responding of subjects in this group was controlled by their conditioning history.

This finding supported the behavior-analytic conceptualization of vicarious reinforcement as a case of discriminative responding by suggesting strongly that apparent vicarious-reinforcement effects are likely to be a result of the discriminative value of the observed reinforced response, as a result of a Congruent history of reinforcement for that same response by the observer. Previous research had only indirectly suggested the same by showing that vicarious-reinforcement conditions can function to extinguish observer matching responses (Bol & Steinhauer, 1990; Deguchi, Fujita & Sato, 1988; Ollendick, Daily & Shapiro, 1983; Ollendick & Shapiro, 1984).

However, two limitations may be noted in the present study. First, it was not possible to determine if discrimination was learned on the basis of reinforcement or punishment contingencies because the Conditioning phase, in both experiments, consisted of reinforcement of target responses and punishment of non-target responses. Second, with respect to the Observation treatments of both experiments, the discriminative value of the contingencies for the model's responses and that of the responses themselves were confounded. Therefore, it may be argued that the present study provides an analysis of factors controlling simple imitation, rather than imitation due to vicarious reinforcement. However, the Observation treatment was consistent with the vicarious-reinforcement conditions of previous studies (Bandura, Ross & Ross, 1963; Dubner 1973; Levy, McClinton, Rabinowitz & Wolkin, 1974; Walters, Parke & Cane, 1965). Furthermore, the main purpose of the present study was to examine the effects of prior learning on imitation in a vicarious-reinforcement situation.

As it was found, in Experiment 2, that subjects did not imitate observed reinforced responses when the observation was Incongruent with their conditioning experience, both simple imitation and vicarious reinforcement can be ruled out. Thus, it is reasonable to conclude that observed response-reinforcement relations fail to function as a discriminative stimulus when said relation is incongruent with the observer's learning history. Nevertheless, future studies should include a control condition in which subjects observe modeling of non-reinforced target response. This would allow independent assessments of the effects of simple modeling in contrast to those of observed reinforcement.

The present study contributes to the understanding of phenomena typically described as "vicarious," by some, by showing a functional relation between extrinsic, direct contingencies and the imitative matching behavior of an observer following observed reinforcement of modeled responses. The findings suggest that cognitively-oriented conceptualizations such as those termed 'vicarious' are unnecessary for the study of behavior. Furthermore, by giving the appearance of explanation, such conceptualizations may discourage research on the proximal determinants of the matching behavior at issue.

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Figure 1. The four stimulus shapes.

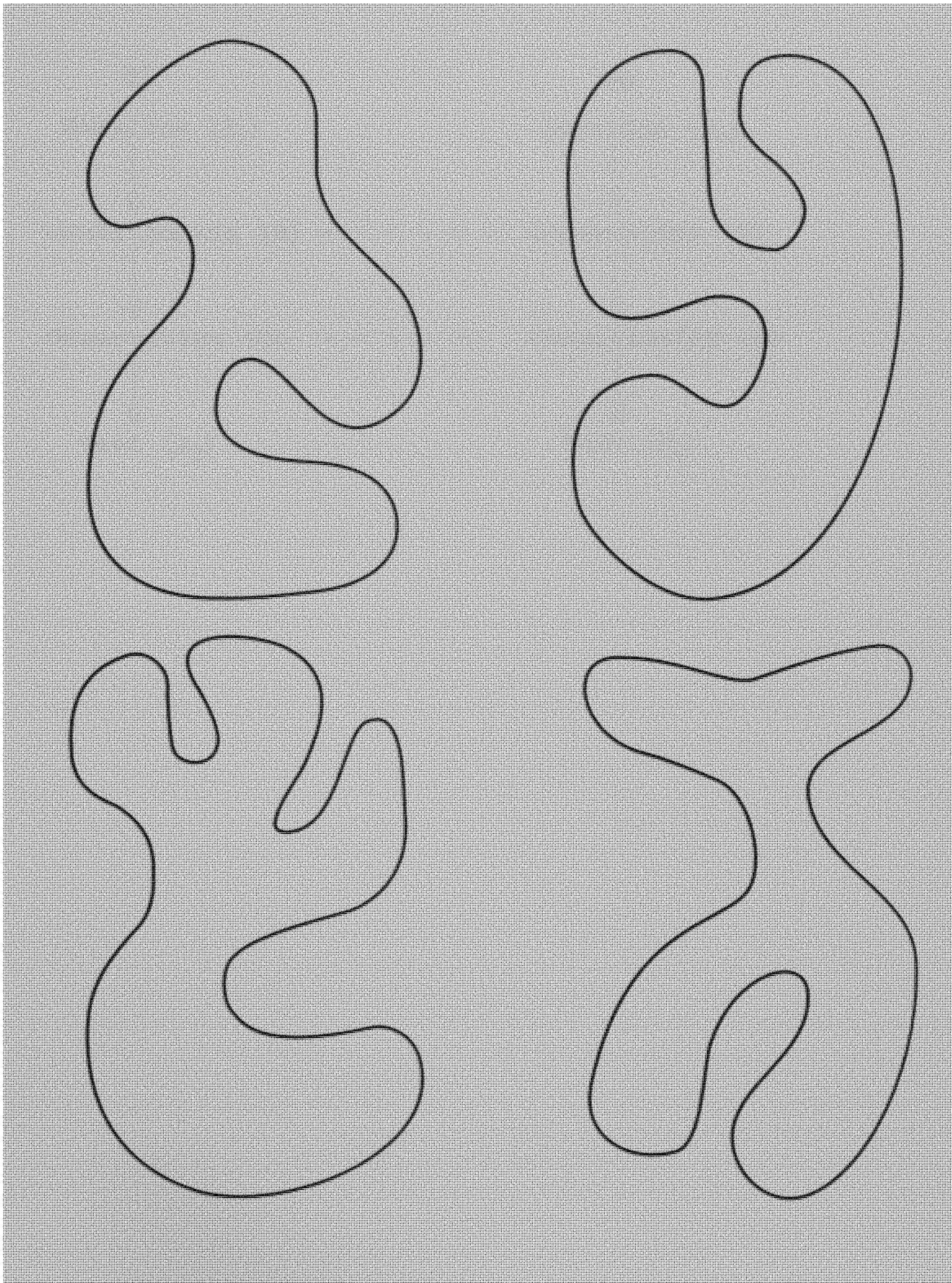

Figure 2. Flow chart of procedure of Experiment 2 for subject pairs.

```
        S1                                S2

   Baseline (A1)                      Baseline (A1)
        |                                  |
        V                                  V
 Conditioning (B) < - - - - -   Observation (C)
        |                                  |
        V                                  V
 Observation (C)   - - - - ->   Conditioning (B)
        |                                  |
        V                                  V
    Test (A2)                         Test (A2)
```

Table 1

Procedure for Assignment of Subjects in Experiment 1 to Target Color

Baseline Color Preference	Target Color Assignment
Neither S with a preference	Yellow or Green
One S with a preference	Non-preferred color
Both Ss prefer the same color	Non-preferred color
Both Ss prefer the opposite color	Run in Experiment 2

Table 2

Proportion of Target Response Scores for Observation and Conditioning Groups Across Baseline and Test Phases of Experiment 1

		Treatment		
		Conditioning	Observation	
Phase	Baseline	n= 16 M= .397 SD= .162	n= 16 M= .409 SD= .204	n= 32 M= .403 SD= .182
	Test	n= 16 M= .863 SD= .189	n= 16 M= .794 SD= .266	n= 32 M= .829 SD= .228
		n= 32 M= .630 SD= .176	n= 32 M= .602 SD= .235	

Table 3

Procedure for Assignment of Subjects in Experiment 2 to Treatment and Target Color

Baseline Color Preference	Pair Group	Assignment Subject Target Color
Neither S with a preference	I or C	Yellow or Green
One S with a preference	I or C	Non-preferred color
Both Ss with the same color preference	C	Non-preferred color
Both Ss with the opposite color preference	I	Non-preferred color

I = Incongruent

C = Congruent

Table 4

Design and Counterbalancing of Experiment 2.

	Sample N = 48							
Treatment	Congruent N=24				Incongruent N=24			
Treatment Order	ABCA N=12		ACBA N=12		ABCA N=12		ACBA N=12	
Target Color	G N=5	Y N=7	G N=5	Y N=7	G N=6	Y N=6	G N=6	Y N=6

Appendix

Condition and Response Recording Sheet

VICARIOUS REINFORCEMENT STUDY

S# ____ Name: ________________ Test Date: ________

Sex: _____ Age: ______ DOB: __________ Ethn.: ______

School: ______________________ Classroom: _________

Experimenter= _______ Target = _______ Tx Order= ______

BASELINE		_______				_______				TEST	
1	11	1	11	21	31	1	11	21	31	1	11
2	12	2	12	22	32	2	12	22	32	2	12
3	13	3	13	23	33	3	13	23	33	3	13
4	14	4	14	24	34	4	14	24	34	4	14
5	15	5	15	25	35	5	15	25	35	5	15
6	16	6	16	26	36	6	16	26	36	6	16
7	17	7	17	27	37	7	17	27	37	7	17
8	18	8	18	28	38	8	18	28	38	8	18
9	19	9	19	29	39	9	19	29	39	9	19
10	20	10	20	30	40	10	20	30	40	10	20
Green=		Target%=				Target%=				Target%=	
Yellow=											

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