The Role of Prior Learning and Direct Reinforcement in Observational Learning and Vicarious Reinforcement

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THE ROLE OF PRIOR LEARNING AND DIRECT REINFORCEMENT IN OBSERVATIONAL LEARNING AND VICARIOUS REINFORCEMENT

by

Larry D. Olsen

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
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While all of the above mentioned people have significantly contributed to this thesis, its content is the sole responsibility of the author.

Larry D. Olsen
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In recent years, the results of a plethora of studies subsumed under such titles as observational learning, imitation, identification, and vicarious learning have led many researchers to question the importance of directly experienced consequences in the socialization of children. Although extrinsic consequences have been stressed as important for one mode of socialization (operant conditioning), a second mode (observational learning) has been proposed which is not dependent upon reinforcers and punishers for its effectiveness.

Aronfreed (1969a), for example, states:

The first channel of socialization is the shaping of behavior through positive and aversive outcomes which are contingent on the child's overt acts. The second channel of socialization is observational learning which does not require outcomes of a child's overtly emitted behavior. (p. 264)

Similarly, Hilgard and Bower (1966) and John, Chesler, Bartlett, and Victor (1968) have argued that observational learning contradicts operant conditioning theory because it does not require overt responding or direct reinforcement.

Many of the criticisms of an operant conditioning explanation of learning by observation have been based primarily on the work of
Bandura and his colleagues. In his numerous works detailing Social Learning Theory, Bandura (1962, 1969a, 1969b, 1970, 1971a, 1971b, 1971c, 1977) proposes that the phenomenon of observational learning cannot be accounted for using the conceptions of instrumental conditioning. Bandura contends that the ability of humans to acquire novel behavior patterns by observation is a prepotent capacity of the human organism which is distinctly different from its capacity to learn by direct experience; i.e., it is innate. In *Social Learning Theory*, he states:

> Except for elementary reflexes, people are not equipped with inborn repertoires of behavior. They must learn them. New response patterns can be acquired *either by direct experiences or by observation* [emphasis added]. (Bandura, 1977, p. 16)

The purpose of the present study is to examine, both theoretically and empirically, the possibility as suggested by Gewirtz (1961, 1968, 1969b, 1971) that the phenomenon of observational and vicarious learning may be more parsimoniously ordered by the precepts of instrumental (operant) conditioning. That is, observational and vicarious learning may be explained by presently existing principles of operant (instrumental) conditioning. No new principles or new theory need be employed. Specifically, I will attempt to demonstrate that when observational learning is considered historically it can be shown that it is an outcome of prior learning rather than an innate learning process.
CHAPTER II

Bandura's Social Learning Theory

Bandura's Social Learning Theory is a stimulus contiguity theory where the "locus of response integration" occurs at the cognitive level by representational mediation. Specifically, when an observer-learner is exposed to a model displaying a sequence of novel responses, the observer-learner symbolically represents the sequence of modeled responses. This is at the cognitive level. This symbolic representation is strengthened by its temporal contiguity with the modeled events. At some later time, in the presence of appropriate situational stimuli, the symbolically encoded sequence will mediate the overt performance. Thus the control of behavior rests, not with environmental determinants, but within the individual at the cognitive level. This is not to say that environmental factors have no affect on behavior. Extrinsic consequences are seen as significantly effecting whether or not a person will choose to perform something which has been learned by observation.

Bandura theorizes that learning by observation is governed by four sequentially ordered processes. He schematically outlines this sequence as in Figure 1.

Insert Figure 1 about here
Attentional Processes

A varied array of stimuli impinge upon an individual in any modeling situation. Factors which delimit this bombardment of stimulation are referred to as attentional processes. Any factor which acts to select which stimuli will be retained as part of the learned response are considered attentional processes. These can range from situational determinants, such as the "distinctiveness" of modeling stimuli, to characteristics of the learner such as "arousal level."

Retention Processes

After the relevant response components have been selected from the modeling situation, they are integrated into the behavioral repertoires at the cognitive level. It is at this point, Bandura contends, that the response is actually "learned." When a person views a modeled behavior, he/she symbolically represents the events. The temporal relationship between the modeled events and this symbolic representation of them strengthens the symbolic representations. This occurs because of the contiguous association between the events as in a stimulus-stimulus (S-S) conception of learning.

The symbolic representation of events can be either imaginal or verbal. Bandura (1977) describes the first of these as follows:
Some behavior is retained in imagery. Sensory stimulation activates sensations that give rise to perceptions of the external events. As a result of repeated exposure, modeling stimuli, eventually produce enduring, retrievable images of modeled performances. (p. 25)

The second representational system occurs on the basis of verbal coding. The more efficient of the two systems, verbal representations involve the cognitive coding of the learning situation into an abbreviated verbal description.

Apparently, the two separate representational systems are necessary, first of all to explain the occurrence of learning by pre-verbal and non-verbal individuals, and secondly to account for the efficiency of observational learning. A person cannot symbolically represent events through verbal coding if he does not command verbal skills, thus the necessity of imaginal representations. But if it were necessary to represent everything learned by observation in imaginal form, it would be extremely cumbersome and doubtful whether such a representational system could be efficient.

Once the modeled events have been symbolically represented, they can be retained in memory and retrieved at some later point in time to guide overt performances of behavior. As Bandura (1977) explains: "On later occasions, images (centrally aroused perceptions) can be summoned up of events that are physically absent" (p. 25).

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Motor Reproduction Processes

Once a new response has been incorporated at the cognitive level, several factors govern the person's accurate translation of the learned response into overt action. First, the physical capabilities necessary for accurate approximations of the modeled behavior must exist in the person. A person lacking vocal chords cannot perform an operatic solo. Secondly, the behavioral components which are used in the construction of the new response must be available in the person's behavioral repertoire. If these two conditions exist, the motor reproduction of the response can at least be attempted. Errorless performance of the response may not occur on the first trial but refinements can be made in the response with repetition. These refinements can be made on the basis of feedback from external sources or self-observation.

Motivational Processes

Even if a person has attended to appropriate modeling stimuli, integrated the response through symbolic representation, and possesses the physical capabilities and necessary component responses for motor reproduction, he still may not perform a response acquired observationally. Performance of the response may be enhanced or inhibited by motivational factors. Anticipated.
consequences for the performance of a learned response regulate, to a great extent, whether or not the response will be overtly expressed. The performance of behavior can be motivated through the use of incentives. Incentives for performance can be derived primarily from three different sources. The first of these is external reinforcement. When a person anticipates that he can secure a valued reward, performance is facilitated. Conversely, when an aversive outcome is expected, performance is inhibited.

The consequences which other people receive for performance of the response can also serve incentive motivational functions. This is the process labeled vicarious reinforcement. Vicarious reinforcement derives its motivation capabilities primarily from the information it provides about conditions existing in the environment. Observation of a model's consequences transmits information to the observer about the probability of favorable consequences for the performance of similar behavior.

A third source of incentives which can regulate performance of the learned response is self-reinforcement. People set standards for their performances and critically evaluate their performances on the basis of these criteria. If a person's performance falls short of a standard, his own evaluative reactions can serve to punish such a response. Similarly, if his performance meets or exceeds the self-determined goal, he can produce self-rewards for his behavior.
Thus, whether or not a person exhibits a response observed in a modeling situation depends first upon whether the relevant activities were attended to, second, whether the information was accurately coded symbolically, third, whether the person possesses the physical and behavioral capabilities necessary for accurate reproductions, and lastly, whether sufficient incentives exist to motivate the person to perform the behavior.

Reciprocal Determinism

Bandura conceptualizes social learning as a "process of reciprocal determinism." Behavior is seen not as the outcome of either environmental or personal influences, but as a continuous process in which behavior, environmental factors and personal factors all interact and regulate each other. As Bandura (1971c) states:

In the social learning view, man is neither driven by inner forces nor buffeted helplessly by environmental influences. Rather, psychological functioning is best understood in terms of a continuous reciprocal interaction between behavior and its controlling conditions. (p. 2)

The basic premise of reciprocal determinism is that the separation of determinants of social interaction is an artificial and arbitrary separation. If the analysis of a sequence of social interaction begins with the person, it appears that events occurring within the
person are the determinants of the behavior which serves to produce a change in the environment. If the analysis begins with environmental events, it appears that these events are the controlling factors which produce changes in behavior. Social learning theory conceptualizes social interaction, not as an unidirectional process, but as a process in which each of the three factors determines the operation of the other. Changing environmental conditions (E) regulate changes in behavior (B), changes in behavior produce changes in the environment, and both contribute to changes in personal determinants of psychological functioning (P). This difference in conceptualization between unidirectional theories and reciprocal determinism is represented schematically as follows:

\[
\begin{align*}
\text{B} &= f(\text{E}) \\
\text{E} &= f(\text{B}) \\
\text{B} &\xleftarrow{\text{P}} \xrightarrow{\text{E}}
\end{align*}
\]

Environmental Determinism  Personal Determinism  Reciprocal Determinism

(Bandura, 1977, pp. 203-204)

Thus, as Bandura (1977) states:

It is not determinism that is in dispute, but whether determinism should be treated as a one-way or a two-way process. Due to the interdependence of behavior and environmental conditions, determinism does not imply the fatalistic view that individuals are only pawns of external influences. (p. 206)
Controversial Issues

In the course of his writings, Bandura identifies several "major points of dispute" between social learning theory and instrumental conditioning conceptions of observational learning. These will be discussed in the following section.

Demonstrating the Occurrence of Observational Learning

As Bandura (1971b) points out, learning has traditionally been conceived of as occurring in two different ways. In the first of these, termed stimulus control, a person's performances are brought under the control of a stimulus which previously did not occasion responding. The second form of learning, response learning, involves the combining of elementary behavioral components into new patterns of responding. Either form of learning can take place observationally. It must be demonstrated, however, that what was presumably learned on the basis of observation did not already exist in the person's repertoire. As Bandura (1971b) states:

Response novelty is defined in terms of empirical criteria rather than a priori estimations. Any behavior that has an extremely low or zero probability of occurrence given appropriate stimulus conditions qualifies as a novel response. (p. 30)
Thus, it must be established empirically that the events, presumably to be learned by observation, have an extremely low probability of occurrence, not for the researcher investigating the phenomenon, but for the person to whom the observational learning has been attributed.

Gewirtz (1971b) also stresses the point that empirical assessment of an observer-learner’s behavioral repertoire is essential before the acquisition of an apparently unique response can be attributed to observational learning. He cites two examples which would give the appearance of learning by observation if the person’s history of reinforcement were not adequately assessed.

First, the observer could have learned the response initially under the same situational determinants that now control the model’s responding. The response may have already been in the observer’s repertoire. Thus, there is only the appearance that the response was learned observationally. This is the equivalent of Miller and Dollard’s (1941) "same-behavior" paradigm as opposed to their "matched-behavior" paradigm in which the observer’s response is functionally related to the model’s response.

In the second example, stimuli in the modeling context may have acquired stimulus control of the observer’s responding in other but not very different contexts. These same stimuli may now rapidly come to control the observer’s responses in the modeling
situation.

Therefore, before the occurrence of a response can be attributed to observational learning, it must be empirically demonstrated that: (a) The response was not already in the observer's behavioral repertoire (i.e., it is a novel response), and (b) the model's responses are the controlling stimuli for (i.e., are functionally related to) the responses of the observer-learner.

The Function of Response Consequences

According to social learning theory, consequences delivered contingently to a person derive their ability to regulate behavior primarily by the information which they convey about the nature of external conditions. Thus response consequences are depicted as producing changes in behavior through the intervening process of cognition. Bandura (1977) portrays the instrumental conditioning conception of reinforcement as "a mechanistic process in which responses are shaped automatically and unconsciously by their immediate consequences" (p. 17). This is an erroneous statement. Operant conditioners do not propose any "mechanism" which "automatically strengthens" a response which it follows. What is said is that consequences delivered contingent upon a response alter the probability (either increase or decrease) of future occurrences of that response. The exact mechanism which is responsible for this
effect is not specified.

Instrumental conditioners contend that cognitive mechanisms which are postulated to account for reinforcement effects (such as Bandura's representational mediation) are inaccessible for empirical investigation and may be unnecessary. If a concept adds nothing to the explanatory or predictive power of a theory it becomes an unnecessary construct.

Environmental events which occur previous to a response which is consistently reinforced do eventually come to set the occasion for that response. These are what instrumental conditions refer to as discriminative stimuli. Thus Bandura's "informative function" of reinforcement appears to be nothing more than the process of stimulus control. Bandura's process of "representational mediation," which is inaccessible for empirical investigations, adds nothing in the way of explanatory or predictive power beyond that of the instrumental conditioner's process of stimulus control.

A second function of response consequences, according to social learning theory, is to motivate behavior. People learn to anticipate consequences for their behavior. Expectations of desired outcomes thus serve to motivate persons to act in order to attain these rewards. Again, Bandura proposes that cognitive processes are necessary to explain how this occurs. Bandura reasons that,
since the consequences for action may be temporally distant from the performance of "foresightful" behaviors, people must cognitively represent the possible outcomes to be impelled to act.

The point at which Bandura begins his analysis is what leads him to this conclusion about "foresightful" behavior. Investigation of the events preceding the occurrence of a "foresightful" act would show that the "cognitive representation" of future events, so necessary according to social learning theory, again adds no increase in explanatory or predictive power over the instrumental conception. When a person's previous history of reinforcement is adequately assessed, it can be shown that "anticipatory" behavior is another instance of stimulus control: an outcome of prior learning. Again after responses are repeatedly reinforced in the presence of consistently associated environmental stimuli, these stimuli come to set the occasions under which the response is likely to be reinforced. Thus, if the antecedent discriminative stimuli which occasion an "anticipatory" response are identified, the need to propose symbolic representation of future events to explain anticipatory behavior becomes questionable.

As an illustration of the argument above, consider the following situation: We enter a room in which a rat is performing a task in a lighted Skinner-box. The rat presses a lever and a concave trough containing a small amount of water is presented. The rat
immediately proceeds to drink from the trough. It appears that the rat is pressing the lever because he "anticipates" that if he does so it will procure for him a drink of water. Even a social learning theorist would not be so bold as to propose that the rat must have symbolically represented the consequences of his actions and was thus "motivated" to press the bar by the possibility of receiving water. He would instead point to the fact that bar pressing had previously been contingently reinforced with the presentation of water.

A third function of response consequences, which Bandura grudgingly accepts as a possibility, is the ability to produce changes in behavior without awareness (i.e., presumably in the absence of symbolic representation of contingencies). In his discussion of the role of awareness in reinforcement effects, Bandura (1971c, 1977) first refers to studies by Spielberger and DeNike (1966) and Dulany (1962, 1968) which purportedly demonstrated that awareness of contingencies preceded any increment in responses which were reinforced. Next Bandura cites studies by Postman and Sassenrath (1961) and Kennedy (1970, 1971) which demonstrated that significant increments in correct responding preceded awareness of the contingencies (as measured by subjects' verbal reports about them). It was demonstrated that the crucial difference between these studies was the length of the intervals used to assess awareness. When
relatively long intervals were used (as in the studies by Spielberger and DeNike), it appeared that awareness preceded learning; but when awareness was assessed at shorter intervals, increments in responding preceded awareness.

In further support of the evidence that reinforcement can produce effects in the absence of awareness, Bandura reports studies by Hefferline, Bruno and Davidowitz (1970). In these studies the responses to be reinforced (unobservable muscular contractions) were imperceptible without amplification (which the experimenters used to identify their occurrence). It was demonstrated that these imperceptible responses could be manipulated by the presentation of positive reinforcers (monetary reward) or the termination of negative reinforcers (aversive stimulation). Since the responses were unobservable, the subjects could not have been aware of the contingent relationship between their behavior and the reinforcers.

Bandura is unwilling to accept these data as demonstrating that reinforcement can produce increments in responding without the intervening process of symbolic representation. He attributes the observed increases in responding to a partial correlation between the response actually being measured and hypotheses generated by the subjects in the search to discover the contingencies of the experiment. This appears to be the social learning equivalent of what instrumental conditioners refer to as adventitious reinforcement.
(Skinner, 1948, 1953). In this case what is adventitiously reinforced is the subject's hypotheses about the "correct" response.

Although this is not an implausible explanation, it is indeed difficult to imagine what hypotheses subjects in the Hefferline et al. studies could have generated which would have been correlated with imperceptible muscular responses.

Bandura (1977) concludes that the controversy over the role of awareness in reinforcement effects is unresolved and states:

Even if improved methodologies established that elementary responses can be learned without awareness of what is being reinforced, this would not mean that complex behavior can be similarly acquired. (p. 21)

Bandura (1977) continues with an illustration of "complex" behavior to support this line of reasoning.

Suppose subjects are presented with words of varying length, and told that their task is to respond by providing a correct number corresponding to each word. Let us select an arbitrary rule that gives the "correct number" by subtracting the number of letters in a given word from 100, dividing the remainder by 2, and then multiplying this result by 5. Correct responses are derived from a higher order rule requiring a three-step transformation of the external stimulus. To create accurate responses one must perform several mental operations in a particular sequence. An unthinking organism is unlikely to show any gains in accurate performance however long its responses are reinforced. (p. 21)

Operant conditioners would paraphrase Bandura's last sentence to read: An inexperienced organism is unlikely to show any gains in accurate performance however long its responses are reinforced.
The illustration quoted above is an example of response chain based on prior learning. Accurate performance of the task requires the prerequisite mathematical skills of subtraction, division, and multiplication. All of these are the outcome of prior learning involving contingent response consequation. Because a response chain is "complex" or involves a "three-step transformation" of a discriminative stimulus, it does not provide sufficient justification for a process such as representational mediation to account for reinforcement effects.

Consider the case of Barnabus, the rat with a college education (Pierrel & Sherman, 1963). We observe Barnabus begin his "complex" task when a light appears on the first floor of his four level experimental chamber. Barnabus immediately proceeds to a spiral staircase and ascends to the second level where he pushes down a raised drawbridge which he crosses to reach a third platform. Next, he climbs a ladder, pulls a car to him on an attached chain, drives the car through a tunnel, climbs a flight of stairs, traverses through a tube, steps into an elevator and raises a flag. The raising of the flag activates the elevator which descends to the first level. Next a buzzer sounds and Barnabus presses a lever which procures for him a pellet of food. This is indeed a complex stimulus-response chain, but again it is doubtful whether a social learning theorist would find it necessary to propose an intervening cognitive
process to explain the performance. It is simply a sequence of responses which are performed in the reverse order from which they were learned. The external stimuli serve as discriminative stimuli for the responses which they precede and as conditioned reinforcers for the responses which they follow. The entire behavior chain is maintained by the terminal reinforcer: the pellet of food.

The component behaviors of a response chain can occur at a covert level (as is the case in Bandura's illustration) without invalidating the arguments above. Thus, simply because a behavioral sequence is complex and/or occurs on a covert level does not mean that the principles of operant conditioning are invalid.

Bandura's proposed informational and motivational explanations of reinforcement effects are the result primarily of his studies of observational learning. If, as Bandura proposes, learning by observation (i.e., from models) is a prepotent capacity of the human organism, it is easy to see how he derives these conclusions. However, if, as will be argued later, observational learning is the outcome of a routine, instrumental conditioning process, one begins to question the necessity and utility of cognitive constructs proposed to explain reinforcement effects. Bandura (1971b) schematically explains the role of reinforcement in observational learning as follows:
If, as proposed earlier, anticipation of reinforcement is re-conceptualized as stimulus control acquired through prior instrumental conditioning, the necessity for cognitive constructs is eliminated. Thus the observational learning schema above can be re-diagramed as:

\[
\begin{align*}
S^D &\xrightarrow{\text{attending responses}} R \\
&\xrightarrow{\text{(modeling stimuli)}} S^\text{reinf} \\
S^D &\xrightarrow{\text{marching responses}} S^\text{reinf}
\end{align*}
\]

The diagram above represents a stimulus-response chain acquired through prior reinforcement. The initial discriminative stimulus (\(S^D\)) sets the occasion for attending-orienting responses by the observer-learner. This \(S^D\) could possibly be the presence of a potential model. The attending responses of the observing person are reinforced by the performance of the modeled behaviors and other external stimuli relevant to the modeled task. The behavior of the model and the relevant stimuli of the modeling situation also serve as \(S^D\)'s setting the occasion for reinforcement of matching responses by the observer. The terminal reinforcer, possibly consequences similar to those received by the model, maintains the
entire response chain. Thus, the probability of future occurrences of imitative behaviors is increased. As with any stimulus-response chain, observational learning chains are acquired through prior learning using extrinsic reinforcement.

Bandura (1971b, 1971c, 1977) contends that the standard instrumental conditioning paradigm outlined above cannot explain many cases of learning by observation. As he describes it:

> It is difficult to see how this scheme (instrumental conditioning) applies to the observational learning that takes place without overt performance of the model's responses during the acquisition phase, without reinforcers administered to the model or to the observer and in which the first appearance of the acquired response may be delayed for days, weeks or even months. (Bandura, 1971b, pp. 10-11)

In this illustration both the observer's matching responses and the reinforcement of them are absent during the modeling situation and the model's actions ($S_D$'s) are absent when the response is performed.

The example of delayed imitation is not as damaging to instrumental conceptions of learning as it appears to be. As Gewirtz (1969b) points out:

> ... all imitative behaviors occur after the model's performance, providing the relevant cues, has terminated and often while the child is not looking at the model, and in that sense they are always performed in the absence of the model. (p. 151)

Thus the length of the temporal delay between the model's
performance and that of the observer is a misleading point. Temporal delays between the presentation of an $S^D$ and the performance of the response which it occasions in many cases may even be part of the reinforcement contingencies. This is true not only for responses learned by observation, but for many behaviors learned by direct tuition. As Skinner (1953) illustrates:

> A response may also be reinforced only if it is delayed by a given interval of time after presentation of the stimulus. Thus, a pigeon is reinforced for pecking a key only if it waits, say six seconds after the key is presented. (p. 126)

As in the case of the pigeon, reinforcing agents in the natural environment often require, as part of behavioral contingencies, the elapse of intervals of time and/or the absence of a specified stimulus. This may be especially true of many behaviors learned through modeling. For instance, exhibition of initiative behavior in the model's presence may lead to punishing consequences for the observer-learner if the supply of reinforcers is such that it would require competition between the model and the learner for their acquisition. The point which must be stressed here, again, is the role of prior learning. The observer has learned through prior experiences to delay the performance of matching responses until the model is absent.

The absence of the model does not mean that there is a total absence of discriminative stimuli when the matching responses are
performed. Other situational determinants which set the occasion for the model's response may rapidly come to control the performance of the observer.

Bandura would contend that the above analysis does not adequately explain how a person retains the behavioral components observed in the modeling context through the temporal delay between the observation and performance of matching behaviors. This objection stems from Bandura's misconception about how reinforcement produces its effects. As mentioned earlier, Bandura believes that instrumental conditioners have proposed a mechanism whereby reinforcers automatically strengthen behaviors which they follow. Again, what the instrumental paradigm says is that contingent delivery of response consequences alters the probability of future occurrences of responding. The mechanisms responsible for this phenomenon are inaccessible for empirical study. Pre-scientific speculation about the possible mechanisms responsible for reinforcement effects are not verifiable by indices independent of the behaviors they are purported to explain.

Retention of learning is necessary for the future performance of any behavior. Any organism must be able to "remember" from one trial to the next what is being reinforced in order for response consequences to affect behavior. This is true not just for the human organism but for all living organisms. What is not clear are the
mechanisms responsible for this phenomenon. It is doubtful if
social learning theorists would bridge the gap between present per-
formances and relevant prior experience in sub-human species with
cognitive processes like "symbolic coding." This issue will be
developed more fully in later sections of this analysis.

Finally, Bandura (1977) concludes that reinforcement is "a
facilitative rather than a necessary condition" for the learning of
behavior. As he points out:

One does not have to be reinforced, for example, to
hear compelling sounds or to look at captivating visual
displays. When attention is drawn to modeled activities
by the events themselves, the addition of positive incen-
tives does not increase observational learning. (pp. 37-38)

Again it must be pointed out that Bandura reaches this conclusion
based on the assumption that observational learning is a prepotent
process.

If observational learning is re-conceptualized as the outcome
of prior learning, reinforcement again becomes a necessary condi-
tion. It is highly probable that "compelling sounds" and "captivating
visual displays" have acquired the ability to command attention
because many times in the past they have occasioned reinforcing
consequences. That is, they are discriminative stimuli. It is not
surprising to find that the "addition of positive incentives" does not
increase learning in their presence. Again consider the example of
the rat which has previously learned to press a bar in the presence

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of a light. Once the response is well learned (i.e., the rat is responding at an asymptotic level), the provision of additional reinforcers will not further increase the rate of responding.

In conclusion, it is argued that Bandura's misconception of instrumental conditioning and his repeated failure to adequately assess the role of prior learning have led him to the erroneous conclusion that reinforcement is not a necessary condition for learning.

**Explanation of Vicarious Reinforcement Phenomenon**

Bandura suggests that social learning theory is more comprehensive than instrumental conditioning approaches to learning partially because it includes vicarious reinforcement effects in analysis of basic learning mechanisms. It will be argued in the following section that vicarious reinforcement effects (like observational learning) are an outcome of prior learning rather than a basic learning mechanism.

Bandura (1971a) defines vicarious reinforcement as, "a change in the behavior of observers as a function of witnessing the consequences accompanying the performance of others" (p. 230). Bandura emphasizes that the term vicarious reinforcement is simply descriptive of response changes as a function of observed consequences and is not meant to explain these behavioral changes. However, Bandura (1969a, 1969b, 1971a, 1971b, 1971c) does propose
several explanations to account for how vicarious reinforcement produces its effects. The first of these is in terms of an informative function similar to that proposed earlier to explain extrinsic reinforcement effects. According to Bandura, the observed outcomes for a model convey information to an observer about the types of behaviors that are likely to be reinforced or punished.

As I argued earlier in the examination of direct reinforcement effects, this "informative function" of vicarious reinforcement is simply stimulus control acquired through prior learning. That is, consequences delivered to models come to serve a S^D's setting the occasion for the extrinsic reinforcement of matching behaviors performed by the observer. Evidence that the "informative function" of vicarious reinforcement may be the equivalent of stimulus control is suggested by Bandura (1971a) when he states: "It should also be noted that studies have not demonstrated that vicarious reinforcement alone can sustain effortful behavior over a long period" (p. 235). Although Bandura would undoubtedly argue that the cessation of responding is due to the fact that the observed consequences have lost their informational value, a more parsimonious explanation is that a discriminated operant has been extinguished.

The second explanation of vicarious reinforcement proposed by Bandura is a "stimulus enhancement effect" (Bandura, 1971a). That is, consequences delivered to the model may highlight critical
features of the environment which occasion reinforcement. If a model is reinforced in the presence of a given set of situational stimuli and not consequated or punished under different environmental conditions, the consequences delivered to the model may aid the observer in discriminating the critical features of the situation.

Again, this is an example of stimulus control. Unlike the previous examples of stimulus control where a single stimulus set the occasion for reinforcement, this paradigm involves what operant conditioners refer to as conditional responding (Lashley, 1938). As Gewirtz (1971b) explains:

In simple discrimination learning (involving simultaneous of successive comparisons), the presence of a single discriminative stimulus attribute (SD) sets the occasion for reinforcement of the "correct" response, and its absence ("S delta") sets the occasion for nonreinforcement. In a conditional discrimination situation (like matching-to-sample), however, the response that could be reinforced on each trial is defined on the basis of the relationship of the attributes of two sets of stimuli: the conditional or standard stimulus, and the discriminative comparison stimuli. The discriminative stimulus thus varies across discrimination trials, changing relative to the (concurrent or preceding) conditional stimulus. (p. 282)

In the case of vicarious reinforcement it is the relationship between situational stimuli and the observed consequences for the model which sets the occasion for reinforcement of matching responses by the observer.

The third possible explanation that Bandura advances for
vicarious reinforcement is an incentive-motivational effect. That is, persons who observe a model receive favorable consequences are "motivated" to perform matching behavior by the "expectation" of similar outcomes. This "incentive-motivational" function was discussed in the previous section of this article dealing with the controversy about extrinsic reinforcement effects. In that previous discussion it was pointed out that the cognitive mechanisms proposed by Bandura and implied by the terms "expectation" and "anticipation" were unnecessary for a functional analysis of behavior.

At that juncture it was proposed that the "incentive-motivational" function of response consequences could be more parsimoniously ordered by the instrumental conditioning conception of stimulus control. Again it is argued that the "incentive-motivational" function of vicarious reinforcement amounts to nothing more than an illustration of this process. In the preceding analysis of the motivational function of direct reinforcement, any antecedent stimulus could have acquired discriminative properties. With vicarious reinforcement a specific antecedent stimulus, the consequences delivered to a model, set the occasion for consequation of initiative behaviors. The basic process involved, however, is still one of stimulus control.

The fourth explanation of vicarious reinforcement proposed by Bandura is the vicarious conditioning of emotional responses. As
Bandura observes, the exhibition of emotional responses by models in response to contingent delivery of consequences can elicit similar (or dissimilar) reactions in persons observing the modeled performance. Bandura proposes that these emotional reactions are acquired through classical conditioning. In this process, previously neutral stimuli (i.e., those that formerly elicited no emotional reactions) come to elicit emotional responses after repeated pairing with an unconditioned stimulus (i.e., a stimulus which elicited emotional responses). In vicarious emotional conditioning the emotional reactions of the model have acquired the ability to elicit emotional reactions in observers through their associative pairing with unconditioned stimuli; the consequences actually experienced on prior occasions by the observer. However, as with his treatment of instrumental conditioning, this classical or respondent conditioning of emotional responses is seen by Bandura as occurring through the intervening process of cognition. As he explains:

... when a stimulus is paired with aversive experiences, the stimulus alone produces emotional responses, not because it is invested with emotional properties but because it tends to elicit emotion-arousing thoughts. In other words, the emotional responses are to a large extent cognitively induced rather than automatically evoked by the conditioned stimuli. (p. 246)

As was pointed out in the earlier discussions about instrumental conditioning, there is a sense in which all organisms must somehow correlate prior occurrences of an event with the
probability of future occurrences of that same event. This is true not only of behaviors considered operant, but also respondent behaviors. What is still unclear are the mechanisms through which this learning takes place. Pre-scientific speculation about the "cognitive" processes involved are of limited utility for theories of learning, whether they are based on instrumental or classical conditioning precepts. Thus, Bandura's "anticipatory self-arousal" seems to be of limited value in the explanation of suppressive or facilitative effects of vicarious reinforcement.

From a more traditionally operant perspective, classical conditioning of physiological responsiveness (i.e., emotional behavior) can be observed for almost any stimulus which has acquired discriminative properties. This does not reduce the process involved to anything other than stimulus control. Again Bandura's explanation of vicarious reinforcement seems to add nothing to the understanding of behavior beyond that entailed in the instrumental conditioning process of discrimination.

The final explanation of vicarious reinforcement which Bandura proposes is "modification of model status." As Bandura (1971a) observes:

Punishment devalues the model and his behavior, whereas the same model assumes emulative qualities when his actions are rewarded. These changes in model status, in turn, are accompanied by corresponding differences in the degree to which observers imitate the model's
Indeed, in the behavioral analysis of what is involved in the conferring of "status" two things stand out. The "status" of the model is inferred from the frequency with which the model is imitated and the diversity of situations in which the model is imitated. Models who are observed to be punished with regularity will be imitated less frequently and under fewer conditions (i.e., will be conferred with low status) than will models who are observed being reinforced for their actions.

Again the process involved seems to be nothing more than stimulus control. Models who are frequently reinforced in diverse situations come to set the occasion for the reinforcement of imitative behavior in diverse situations. Persons learn through differential reinforcement that emulation of frequently rewarded (i.e., high status) models frequently results in reinforcing outcomes and that imitation of unsuccessful models may have deleterious consequences.

The preceding analysis demonstrates that vicarious reinforcement effects can be parsimoniously ordered by the operant conditioning paradigm of stimulus control. Thus, there appears to be little justification for proposing that vicarious reinforcement represents a basic learning process which is discontinuous with instrumental conceptions of learning.
Explanation of Self-Control of Behavior

As with vicarious reinforcement effects, Bandura (1965b, 1969a, 1971a, 1971c, 1977) proposes that the instance in which a person functions to regulate his own behavior and its consequences is discontinuous with theories of learning which emphasize external agencies in the development and maintenance of behavior. As he states:

Theories that explain human behavior as solely the product of external rewards and punishments present a truncated image of people because they possess self-reactive capacities that enable them to exercise some control over their own feelings, thoughts, and actions. Behavior is therefore regulated by the interplay of self-generated and external sources of influence. (Bandura, 1977, p. 129)

Operant theorists would not dispute the fact that humans do manipulate their environment in such a way as to provide consequences for their own actions. However, they would dispute whether persons "possess self-reactive capacities" as part of their behavioral endowment or whether the development and maintenance of "self-reactive capacities" is dependent upon "external sources of influence." Bandura himself acknowledges the fundamental role that sources of external control play in the development of behavior characterizes as self-controlling. As he states:

Self-reinforcing responses are undoubtedly developed to some extent through selective reinforcement. In this learning process, an agent adopts a criterion of what
constitutes a worthy performance and consistently
rewards persons for matching or exceeding the adopted
criterion level, but non rewards or punishes perform-
ances that fall short of the minimum standard. When
persons subsequently respond to their own behavior
they are likely to reinforce themselves in a similarly
selective manner. (Bandura, 1971a, p. 252)

Bandura also points out that patterns of self-reinforcement
can be acquired through the observation of models who respond to
self-prescribed standards for reinforcement. If, as argued earlier
in this paper, the capability of humans to learn behavior patterns
from modeling situations is itself the resultant outcome of prior
learning, it is indeed difficult to visualize the development of self-
control as anomalous with reinforcement conceptions of learning.
Bandura not only acknowledges the primary role of external sources
of influence in the establishment of self-control; he also points to
the necessity of external supports in the maintenance of such behav-
iors. As he points out, self-punishing behavior is effective in con-
trolling behavior because many times it proves valuable in the
avoidance of aversive externally administered consequences. Simi-
larly, rewarding oneself for stringent performance standards fre-
quently results in favorable consequences administered by the social
community. Thus it appears that at least periodic support from
external sources is necessary for the maintenance of self-control
behaviors.

Again the focus of theoretical approaches to behavior control
shifts from external sources of control to an emphasis on external determinants of behavior. As Skinner (1953) illustrates:

A man may spend a great deal of time designing his own life—he may choose the circumstances in which he is to live with great care, and he may manipulate his daily environment on an extensive scale. Such activity appears to exemplify a high order of self-determination. But it is also Behavior, and we account for it in terms of other variables in the environment and history of the individual. It is these variables which provide the ultimate control. (p. 240)

The Role of Cognitive Processes in the Control of Human Behavior

The role which cognitive processes play in the determination of behavior is central to all of the issues of controversy between radical behaviorism and social learning theory. This was briefly alluded to in earlier sections of this paper. It will now be examined in greater detail in the following discussion.

The first question which must be asked when cognitive mechanisms are proposed as determinants of behavior is: Are they necessary in the explanation of behavior? In other words, does the inclusion of such mechanisms provide us with predictive power greater than that supplied by routine instrumental conditioning processes? Bandura (1977) proposes that it does:

If human behavior could be fully explained in terms of antecedent inducements and response consequences, there would be no need to postulate any additional regulatory mechanisms. However, most external influences
affect behavior through intermediary cognitive processes. Cognitive factors partly determine which external events will be observed, how they will be perceived, whether they leave any lasting effects, what valence and efficacy they have, and how the information they convey will be organized for future use. (p. 160)

However, in the preceding analysis of other controversies between social learning theory and operant conditioning it was demonstrated that behavioral processes which Bandura maintained required cognitive mechanisms for explanation could be "fully explained in terms of antecedent inducements and response consequences." In the following discussion we will attempt to demonstrate that determinants of behavior arising from cognitive mechanisms can be fully encompassed by the precepts of instrumental conditioning.

The first role of cognitive processes proposed by Bandura is one of motivating behavior. Cognitive representation of future outcomes (i.e., anticipation) can impel persons to act in order to acquire desired outcomes or to avoid deleterious ones. As was demonstrated in the previous discussion of incentive-motivational functions of both direct and vicarious reinforcement, this "motivational" function is adequately encompassed by the operant conditioning process of stimulus control. At that juncture, it was pointed out that if a person's previous history of reinforcement were adequately assessed, it could be demonstrated that the variables controlling
responding rested with environmental agencies. Specifically it was shown the stimuli which preceded the response had acquired the ability to evoke a response. Through their previous association with consequent events, these stimuli had come to "set the occasion" for reinforcement. Thus if a specific performance is analyzed historically with special emphasis on relevant prior learning, the proposal that future events were "anticipated" via cognitive processes provides no increment in the predictive power of operant theory. The inclusion of such mechanisms may even obscure a scientific analysis of the process under study.

Bandura also proposes that people cognitively construct standards against which they judge the adequacy of their performances. If their performances fall short of these prescribed goals, people are "self-motivated" to improve their performances. Again, as was mentioned in the discussion of "self-reinforcement," a functional analysis of environmental control of behavior indicates that such behaviors are established and maintained by environmental agencies. People do not "spontaneously" construct goals against which to judge the adequacy of their performances. Rather, they learn, through prior contingent reinforcement and/or punishment supplied by the social community, acceptable standards of performance.

Again, what must be emphasized is that "self-evaluative"
behaviors are just that: behaviors. The controlling variables for these behaviors are to be found in the environment external to the person performing them. Thus, we need not point to discrepancies between cognitively constructed standards and overt performance to explain why a person is "motivated" to achieve more exact performances. We need only to demonstrate that such behaviors occasion reinforcement or avoid punishment in the social community. Again it is revealed that the inclusion of cognitive processes provides no differential predictive power to the precepts of instrumental conditioning.

Next, Bandura proposes that people must cognitively repre-
sent environmental contingencies in order to learn what is being reinforced or punished. In other words, people must be "aware" of the relationship between their behavior and its consequences. As was pointed out earlier in this paper, operant conditioners recognize that there is a sense in which all organisms must discriminate the similarity between responses from one performance to the next. Thus a rat must be able to discriminate that the bar press which he emits in the present is similar to bar press responses which have been reinforced in the past. The question which must be asked is: Is the delineation of the mechanisms underlying this ability necessary for an explanation of behavior? In other words, does this type of reductionism add significantly to the predictive power of our theory?
If the occurrence of a response can be adequately explained in operational terms of antecedent and consequent stimuli, reductionism to find the "cause" of the observed effects is of limited utility in delineating the determinants of behavior. As Gewirtz (1971b) illustrates:

... in discussions in the literature on functional response classes of both nonverbal and verbal organisms, there has typically been no special heuristic emphasis on a subject's discrimination that he has performed a response like those that previously have led to reinforcement in that context, nor has a heuristic need been felt to analyze a subject discrimination in terms of its various component events. Even though many researchers would conceive that a discrimination process is involved, it has rarely been thought necessary in conditioning analyses to introduce operations for studying such a discrimination, over and above those implied in the conception of a functional response class. (p. 296)

As an example of the argument presented above consider the study by Kaufman, Baron and Kopp (1966) cited by Bandura (1977) in support of his contention that symbolic representation of contingencies is necessary for learning. In this study all subjects received reinforcement contingent upon manual responses on a one-minute variable interval schedule. However, one group of subjects was informed that their responses would be reinforced once every minute (Fixed interval schedule). Another group was informed that their responses would be reinforced about every 150 trials (Variable ratio schedule). The final group was correctly informed about the
prevailing reinforcement contingencies. The results of the study showed that the subjects' performance rates were in accordance not with actual reinforcement contingencies of the study (i.e., one-minute fixed interval) but rather with the schedules of reinforcement which they were informed would prevail in the experiment.

Bandura contends that the above study demonstrates that people must have cognitively represented contingencies different from the actual contingencies (i.e., in accordance with the "false" contingencies). Otherwise, the rate of responding would have been in accordance with the prevailing schedule of reinforcement.

Bandura proposes that the subject's "belief" about (i.e., cognitive representation of) the schedules of reinforcement was manipulated by the divergent instructions (i.e., lies) given to the experimental groups.

A closer examination of the manipulations involved in the experiment reveals that the variable which was actually manipulated was the verbal instructions given to each group. The manipulation of "beliefs" can only be inferred from the differences in responding it is proposed to explain. If we concentrate on the external variables which were manipulated, we can readily demonstrate that the results of the experiment are exactly what would be predicted under the process of stimulus control.

The subjects could not be considered experimentally naive
because undoubtedly they had a history of previous learning relevant to the experimental situation. In natural settings verbal instructions acquire properties as discriminative stimuli through their association with contingent response consequence. Unless there were other stimuli in the experimental situation which were not in accordance with these (i.e., stimuli which might indicate that the experimenters were lying), then these verbal S\textsuperscript{D}'s, whether accurate or not, would still occasion responding in accordance with the schedules of reinforcement which they had occasioned on similar previous occasions. Thus we would predict that the rates of responding would be in accordance with the schedule of reinforcement occasioned by the antecedent stimuli. Further, we would propose that if the experiment were extended for enough trials, the subjects would come to respond in accordance with the actual schedule of reinforcement prevailing in the situation.

An analogous example using subhuman species may help clarify this point. Again return to the rat toiling away in a Skinner-box. This time the rat's bar press responses have been previously reinforced on a one-minute variable interval schedule. The presence of a light has consistently set the occasion for reinforcement of responses on this schedule (i.e., it is an S\textsuperscript{D}). All of a sudden we "whimsically" change the schedule from one-minute variable-interval to one-minute fixed-interval. We turn on the light and lo-and-behold
the rat continues to respond at a steady rate rather than that characterized as a fixed-interval scallop. The operant conditioner need not postulate that he has manipulated the rat's "belief" about the prevailing contingencies to explain why we observe this phenomena. He need only point out the relevance of the previous history of reinforcement. Again it is argued that the inclusion of cognitive constructs which can only be inferred and not independently measured and/or manipulated adds nothing to instrumental conceptions of learning.

In a related issue, Bandura proposes that persons must code and store for memory representation the topographical characteristics of behavior. These coded representations, which can be either verbal or imaginal, can be recalled at some later time to mediate between external stimuli which occasion a response and the overt performance of the response. Again it must be asked: Does the addition of such reductionistic processes add something to an operant analysis of behavior? The following discussion of the operant conditioner's descriptive concept of a functional response class (Skinner, 1935) shows that it does not.

A functional response class is a class of responses which are defined not on the basis of topographical similarity but rather on their relationship to controlling environmental stimuli. Manipulations which effect the occurrences of only a few responses in a given
functional response class may produce similar changes in the probability of all responses within that response class. Responses which constitute members of this response class are acquired and maintained through differential reinforcement. New responses are routinely added to the functional response class via this process and will be maintained in the absence of direct reinforcement so long as they are not explicitly punished and so long as other members of the functional response class are reinforced.

Gewirtz (1969a, 1969b, 1971a, 1971b) proposes that the concept of functional response classes more parsimoniously orders the above phenomenon than inexplicitly stated cognitive mechanisms which cannot be indexed independent of the performances they are proposed to explain or the differential setting conditions developed to establish them. As he explains:

\[ \ldots \text{when an organism acquires a functional response class, in a sense a discrimination of similarity is made between his present response and his past responses that have been reinforced in the discriminative context (e.g., as in bar pressing or in imitative matching responses). Thus, there is a sense in which all organisms must somehow bridge the gap between relevant experience and later response performance that depends on earlier experience. What is not obvious, however, is the means by which this is accomplished; and theoretical approaches may differ in whether they attempt to bridge this gap only with their theory or also with operations that index successive aspects of the postulated process.} \text{(Gewirtz, 1969b, p. 138)} \]

Gewirtz continues:
For most heuristic purposes it has typically been assumed by conceptualizers of human and subhuman learning to be unnecessary to posit a special discriminative process over and above that implied in the functional response class as defined by the subject overt responding. For, unless an independent operation is specified and ultimately employed to index a postulated representational or cognitive process, the parsimony and utility of posting the occurrence of such an implicit process to bridge the time gap between experiences and subsequent performance is questionable, both for infra-human and human subjects. (p. 138)

It appears that the addition of cognitive mechanisms to mediate between antecedent environmental stimuli and the performance of behavior does not provide differential leverage on the process of behavior change. At this time, the cognitive mechanisms proposed by Bandura cannot be manipulated for scientific study independent of setting conditions used to establish them, nor can their effects be measured independent of the behaviors which they are proposed to explain. Thus, we argue that the inclusion of such mechanisms, however intuitively plausible they may seem, is not parsimonious and can only serve to dissuade empirical investigations of environmental determinants of behavior.

The Issue of Determinism

It was argued in the preceding section that the cognitive processes proposed by Bandura were not in fact necessary for a descriptive analysis of behavior. What then becomes of Bandura's concept...
of reciprocal determinism? The cognitive mechanisms proposed by Bandura allowed people to be "partially free" to control their own behavior. It will be recalled that Bandura schematically represented reciprocal determinism as follows:

(Bandura, 1977, p. 204)

In this schematic, "B" represents behavior, "E" represents environmental influences and "P" represents personal influences. In the conceptual analysis each factor effected the other factors in a reciprocal fashion. That is, changes in behavior not only produced changes in the environment but the resultant environmental changes influenced subsequent behavior. Likewise, changes in behavior influenced changes in personal factors and the resultant change again influenced subsequent behavior. In a similar fashion there was reciprocal interaction between personal and environmental determinants of behavior.

It has been argued throughout the preceding discussions that the "personal influences" proposed by Bandura can be more parsimoniously ordered by the instrumental conditioning concept of previous history of reinforcement. That is, these "personal influences" may be a resultant outcome of prior learning acquired on the basis of contingent response consequences. In the analysis of any
specific behavioral sequence we can adequately account for these personal influences only if we assess the relevance of these historical variables. If we do not, behavioral sequences which represent nothing more than stimulus control of a functional response class may appear to be discontinuous with reinforcement conceptions of learning (as is the case with observational learning).

If we now replace Bandura's personal influences in the schematic with the operant conditioner's history of reinforcement, we get:

\[
\begin{array}{c}
B \\ \xleftarrow{H} \\ \xrightarrow{\text{E}} \\
\end{array}
\]

However, closer examination of the process reveals that a person's history of reinforcement cannot directly influence environmental events. A person's relevant prior history can influence how a person responds to environmental influences. Environmental events can selectively activate relevant prior history. This is precisely what a discriminative stimulus does. Thus our schematic representation becomes:

\[
\begin{array}{c}
B \\ \xleftarrow{H} \\ \xrightarrow{\text{E}} \\
\end{array}
\]

The reciprocal relationship between environmental events and behavior (\(B \leftrightarrow \text{E}\)) is very real. Behavioral performance does produce changes in environmental conditions. The resultant
environmental changes alter the probability of subsequent similar behaviors. This reciprocal relationship between environmental and behavior is what operant conditioners refer to as a **contingency**. However, it must be pointed out that such contingencies effect subsequent behavior. Thus our diagram should be redone as follows:

\[ E^1 \rightarrow H \rightarrow B \rightarrow E^2 \rightarrow \text{Subsequent } B \]

In the above schematic an environmental event \((S^D)\) selectively activates relevant prior experience (history) which influences a behavioral response. This behavioral response alters environmental conditions. The environmental change alters the probability of future performances of similar behaviors.

The concept of an \(S^D\) implies that the person's relevant history and antecedent environmental stimuli cannot be artificially separated since the stimuli have acquired their ability to set the occasion for behavior through prior association with contingent response consequences. Thus we can combine the "\(E^1\)" and "\(H\)" components of our schematic into the single concept, \(S^D\). Thus, we have:

\[ S^D \rightarrow B \rightarrow E \rightarrow \text{Subsequent } B \]

OR

\[ S^D \rightarrow B \rightarrow E \]

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The final schematic above should be recognized as the instrumental paradigm of learning. Thus, it appears that when Bandura's "personal influences" are appropriately conceptualized (i.e., as history of reinforcement) behavior is a function of its consequences \[ B = f(E) \].

Summary

In the preceding discussion it was demonstrated that Bandura's consistent failure to consider relevant prior learning in behavioral analysis has led him to propose that cognitive mechanisms are necessary for an explanation of determinants of behavior. This is especially true for observational learning (which Bandura considers the basis of all learning). Thus Bandura concludes social learning theory, and the phenomena which it purports to explain, are discontinuous with instrumental conceptions of learning. Reconceptualization of these phenomena within the framework of operant conditioning however revealed that they were not in fact anomalous. It was further argued that operant theory provided a more parsimonious explanation of learning than social learning theory because it does not require constructs which, although intuitively plausible, cannot be measured independent of the behaviors they are purported to explain.
It is apparent from the foregoing discussion that acceptance of observational learning as a prepotent capacity of the human organism is premature. Arguments for the primary of such a process are derived primarily from the writings and empirical research of Bandura and his colleagues (e.g., Hilgard and Bower, 1966) and as such should not be accepted without reservation. Throughout the preceding analysis it was argued that the process labeled observational learning and the correlated process of vicarious reinforcement could be parsimoniously ordered by the precepts of instrumental or operant conditioning.

The possibility that observational learning (or generalized imitation) phenomena may represent the outcome of a routine instrumental conditioning process in which discriminative stimulus control over matching responses has been acquired has been suggested by several operant theorists (Baer & Sherman, 1964; Gewirtz, 1969b, 1971a, 1971b; Gewirtz & Stingle, 1968; Miller & Dollard, 1941; Rosenbaum & Arenson, 1968; Skinner, 1953).

The most comprehensive attempts to detail observational learning and vicarious reinforcement phenomena within the
instrumental conditioning framework have been the efforts by Gewirtz (1969b, 1971a, 1971b; Gewirtz & Stingle, 1968). According to this paradigm, observer-learners may have acquired a functional response class composed of topographically diverse responses which are matched to the demonstrated responses of a model or models. The controlling antecedent stimuli for this functional response class are the actions of the demonstrator model and other environmental stimuli present in the modeling context. These other environmental stimuli may include such things as the stimuli which control the model's responding and the consequences delivered to the model (i.e., vicarious reinforcement). Such situational stimuli may interact with the controlling stimuli of the model's responses to control the observer-learner's responses. Thus, on any given trial, it is the conditional relationship between the performances of the model, the situational stimuli, and the matched behaviors from the observer's repertoire which define the responses likely to be reinforced. Finally, every instance of imitation need not be directly reinforced. So long as other responses in the functional response class are intermittently reinforced imitative matching performances will be maintained.

This paradigm is similar to the processes termed "learning-to-learn" by Harlow (1959) and "rule" or "strategy learning" by Gagné (1968, 1970). The following discussion will examine in
greater detail how this instrumental conditioning conception can parsimoniously order the phenomenon of observational learning and vicarious reinforcement.

A Functional Response Class of "Matched" Behaviors

As was mentioned earlier, when a functional response class is acquired it is the relationship between members of the response class and the extrinsic controlling stimuli which is important. In the case of a rat's bar press the members of the functional response class are topographically similar. But, the members of a functional response class need not be. In the case of imitative behaviors the functional response class could be composed of topographically diverse responses all of which are matched to the demonstrations of models. The important point is that these matching responses are all functionally related to the same controlling environmental stimuli. Thus their probabilities of occurrence vary concurrently. That this functional response class can be acquired and maintained through direct extrinsic reinforcement is demonstrated in studies by Baer, Peterson and Sherman (1967); Baer and Sherman (1964); Lovaas, Freitag, Nelson and Whalen (1967); Metz (1965); Parton (1970); Peterson (1968); Waxler and Yarrow (1970); and Williams (1971).
Gewirtz (1971) proposes that the antecedent stimuli which have acquired control of the imitative functional response class can be equated with the conditional responding paradigm of Lashley (1938) or the matching-to-sample paradigm of Cumming and Berryman (1965). In straight-forward discrimination learning a single stimulus sets the occasion for reinforcement and its absence occasions nonreinforcement. However, in conditional responding (or matching-to-sample) it is the relationship between two or more stimulus conditions which occasions reinforcement. As Gewirtz (1971) explains:

The discriminative stimulus thus varies across discrimination trials, changing relative to the (concurrent or preceding) conditional stimulus. And the conditional stimulus comes to function not as a simple cue for individual responses, but rather as a differential set or selector for discriminative responses: a subject learns to make a particular matching response in one demonstration context and another in a second context, and so on. (p. 282)

Thus the responses of a model serve as a comparison stimulus against which the observer-learner selects responses from the imitative functional response class. The relationship between these stimulus attributes (i.e., similarity) constitutes the conditional discrimination which sets the occasion for reinforcement.

Situational stimuli can also be considered as part of this
conditional discrimination. Thus, as is the case with vicarious reinforcement, the consequences delivered to the model can also come to control matching responses by the observer-learner. The probability of imitative responses thus may increase when the model is reinforced and decrease when the model is punished. Following this paradigm, the conditional stimuli (i.e., the model's responses and/or the consequences delivered to the model) need not be present when the observer-learner performs the matching behaviors.

The Role of Extrinsic Consequences in the Development and Maintenance of the Functional Response Class

The process of conditional responding proposed above is developed and maintained through the use of extrinsic consequences for matching responses. Gewirtz proposes that under naturalistic conditions the first occurrences of imitation "will occur through physical assistance or instrumental training" (p. 282). Once established, these matching responses are likely to be further strengthened by the contingent delivery of extrinsic consequences delivered by environmental agents. On this basis children can rapidly acquire a functional response class of imitative responses. Therefore, new responses will be routinely added to the functional response class so long as members of the class are at least intermittently reinforced. In fact, it is highly probable that in natural settings, reinforcement
for imitative behaviors will be intermittent.

Again what must be emphasized is that the process described is the outcome of prior learning, not a prepotent capacity to learn by observation. When considered in this historical perspective, which emphasizes a person's previous history of reinforcement, observational learning phenomena do not appear to be discontinuous with instrumental conceptions of learning. Indeed, it would seem that the precepts of operant conditioning are able to more parsimoniously order the phenomena than cognitive approaches which are based on processes which cannot be empirically tested for validity.
CHAPTER V

Research Strategies

If, as suggested in the previous sections, the prior learning history of subjects is an important consideration in empirical studies of observational learning and vicarious reinforcement, the task of researchers studying these phenomena is complicated. Failure to implement experimental controls for this relevant learning may lead researchers to propose a prepotent process, such as observational learning, to explain experimental results which in reality may only reflect a process acquired on the basis of this prior learning. However, as Gewirtz (1971b) points out, the necessary controls are difficult to implement because "normal children characteristically display imitative behaviors at early ages" (p. 293). Therefore the possibility that observational learning may reflect an acquired discrimination can probably never be definitively ruled out or demonstrated. However, this does not mean that empirical studies cannot be devised, implementing experimental controls, which in general can be considered supportive of this alternative possibility.

The vast majority of studies which seemingly are supportive of social learning theory conceptions of observational learning (Bandura, Ross & Ross, 1961, 1963a) and vicarious reinforcement
(Bandura, 1962, 1965; Bandura, Ross & Ross, 1963b; Dubanoski, 1967; Fernandez & Liebert, 1970; Flanders & Thistlewaite, 1970; Geshuri, 1972; Hamilton, 1970; Kelly, 1966; Liebert & Fernandez, 1969, 1970a, 1970b; Marlatt, 1970; Walters, Leat & Mezei, 1963; Walters & Parke, 1964; Walters, Parke & Cane, 1965) displayed a consistent failure to implement any type of controls for relevant prior learning. In these studies the subjects were brought into the experimental setting and exposed (either visually or auditorily) to a model demonstrating the critical responses of the study. Once they had observed the entire sequence of modeled behaviors (including the accompanying consequences of the model in the vicarious reinforcement studies) the subjects were placed in a situation similar to that in which they had observed the model responding. Frequency of critical responses (i.e., those demonstrated by the model) was measured and compared to control groups.

For the studies on observational learning (Bandura, Ross & Ross, 1961, 1963a), which did not involve exposure to vicarious consequences, the subjects' critical response frequency was compared to that of controls who were placed in the testing situation but received no exposure to the model. For the studies on vicarious reinforcement, comparisons were made between subjects who saw the model rewarded, subjects who did not observe consequences for the model, and/or subjects who saw the model punished. All of
these studies demonstrated facilitative effects for exposure to a model. The studies dealing with vicarious consequences also consistently demonstrate the differential control which they exert over responding. However, none of these experiments allow for a determination of whether the observed effects represent a prepotent learning process or are merely the resultant outcome of prior learning.

Gewirtz (1971b) proposes several research strategies which, if implemented in empirical studies, could provide the necessary controls for prior learning. The first of these would be to use subhuman species whose pre-experimental history could be readily controlled. Several studies (Chesler, 1969; Church, 1957; Crawford & Spence, 1939; Darby & Riopelle, 1959; Groesbeck & Duerfeldt, 1971; Haggerty, 1909; Hayes & Hayes, 1952; Herbert & Harsh, 1944; John, Chesler, Bartlett & Victor, 1968) have demonstrated observational learning phenomena in subhuman species. However, even these studies have routinely failed to implement controls for relevant pre-experimental history (cf. Hall, 1963).

A second method of controlling for relevant prior learning suggested by Gewirtz is to employ human subjects which have not exhibited imitation. Studies of this type typically use retarded children as experimental subjects. Several studies using such children (Bry & Nawas, 1972; Hingtgen, Coulter & Churchill, 1967;
Lovaas, Berberich, Perloff & Schaffer, 1966; Lovaas, Freitag, Nelson & Whalen, 1967; Metz, 1965; Williams, 1971) have demonstrated that generalized imitative repertoires can be developed using differential reinforcement.

The study by Bry and Nawas (1972) is of particular interest because it was specifically designed as a test between the S-S conception of Bandura and the S-R conception of Gewirtz. In this experiment two severely retarded and two profoundly retarded children which did not display any matching behaviors (determined on the basis of observation and testing) served as subjects. The two severely retarded subjects were paired in a yoke-control procedure as were the two profoundly retarded S's in a replication.

The experiment consisted of four phases (A, B, C, D). In phase "A" one of the subjects was exposed to a model which demonstrated simple motor tasks to be imitated. One of the experimenters prompted and physically guided the subject in the reproduction of responses matched to those of the model. If the subject imitated the modeled response he was reinforced. This procedure (including physical guidance and prompting) was duplicated for the control subject except the control was never reinforced for imitative responses, if any were performed.

In the early part of phase "B" both subjects were reinforced for imitation. Immediately following the early part of phase "B,"
both subjects were tested for imitation of the sequence of modeled responses they observed in phase "A" without prompting. Each correct imitation was reinforced. This was done to test whether or not the control subject had acquired any of the phase "A" responses by mere exposure to the model.

After this a procedural reversal was implemented for the experimental subject. Under this procedure imitative responses were never reinforced and non-imitative responses were. Next the experimental procedure was reversed again and reinforcement was reinstated for imitation. This was done to demonstrate that imitation was under control of the reinforcement operations. Next in the late stage of phase "B" both subjects were reinforced for imitation until they reached criterion. Phase "C" involved the implementation of a procedural reversal for both subjects like the earlier one for the experimental subject. Finally, in phase "D" reinforcement for imitation was reinstated for both subjects.

The results of this study strongly support an S-R interpretation of learning in that they demonstrated that reinforcement was necessary for the learning of imitation. In phase "A" the experimental subject began to match the behaviors of the model while the control subject, although prompted and physically assisted, made no progress at all. In phase "B" when the control subject was also reinforced, he too began to imitate. In the test situation the control
subject was no more proficient at imitating responses which he had
previously observed (phase A items) than at imitating new
responses (phase B items). From this it appears that mere
"contiguous sensory stimulation" was insufficient to facilitate
imitation. The procedural reversals employed for the experimental
subject and for both subjects (phases C and D) demonstrated
that imitative responses for all subjects were under reinforcement
control.

This study cannot be considered definitive because it is
impossible to demonstrate that the subjects did not previously have
an imitative repertoire. Nevertheless, an attempt was made to
assess this important variable and the results are supportive of an
operant conditioning interpretation.

An experiment by Williams (1971), also using retarded chil-
dren, extends this analysis to include vicarious reinforcement
phenomena. In this study children who did not display imitation
were differentially reinforced for imitation in the presence of a
model who was conseuated for behaviors. After training, the
consequences of the model exerted discriminative control over imi-
tation. Thus it appears that studies using retarded children, who's
history of reinforcement can be more readily assessed, lend sup-
port to the instrumental conditioning paradigm advanced by Gewirtz
as a parsimonious explanation of observational learning and
vicarious reinforcement phenomena.

The two strategies for assessment of prior learning described above require an inferential jump in order to generalize the empirical findings to the population of "normal" children. Many psychologists and social psychologists, therefore, would find the validity of such research strategies questionable. Therefore, Gewirtz proposes a third method of controlling for pre-experimental learning when "normal" subjects are employed for experiments on observational learning and vicarious reinforcement. This strategy is essentially a procedural reversal of the reinforcement contingencies presumed (or demonstrated) to be in effect in the social community.

If we begin with the not implausible assumption that a model's performances have acquired discriminative properties through a frequent association with contingent reinforcement (i.e., previous history of reinforcement), then, if we reverse the contingencies, the subjects matching performances should in time, change in line with the environmental realities. An example using vicarious reinforcement may be instructive. Assume that reinforcers delivered to a model have frequently set the occasion for the reinforcement of matching performances by an observer-learner. When the observer witnesses a model reinforced and then is given the opportunity to imitate, we would predict that he would imitate (as
Many studies on vicarious reinforcement have demonstrated).

However, if we now arbitrarily change the contingencies and either punish matching responses, extinguish them (i.e., no longer reinforce them) or differentially reinforce other, non-matching responses, we would predict that the observer would eventually cease imitation. In other words, the consequences delivered to the model would lose their discriminative properties. The effects of such a procedure would not be immediate and therefore would require repeated exposure to the model.

Many studies on vicarious reinforcement have sought to investigate the relative effectiveness of vicarious reinforcement in comparison with direct reinforcement. Some of these studies, indirectly, provide the opportunity to assess the relevant prior learning of the subjects using the strategy outlined above.

Seven of the studies (Braun, 1972; Finch, 1971; Hamilton, 1970; Kelly, 1966; McBreaty, Marston & Kanfer, 1961; Phillips, 1968a; Rosenbaum & Bruning, 1966) which attempt to compare the relative effectiveness of vicarious reinforcement and direct reinforcement do not allow such a comparison. In these studies one group of subjects receives vicarious reinforcement and another group receives direct reinforcement and the two groups are compared. This procedure does not involve a reversal of contingencies and thus cannot be used to assess the contribution of prior learning
to vicarious reinforcement effects.

In a second group of studies (Clark, 1965; Condrell, 1967; Kanfer & Marston, 1963; Liebert & Fernandez, 1970a; Marston, 1966; Marston & Kanfer, 1963; Phillips, 1968b) comparing the effects of vicarious and direct reinforcement, some of the subjects receive both vicarious and direct reinforcement. Such a design would allow for a reversal of contingencies to be employed, but in none of these studies is such a manipulation made. There is no discrepancy between the consequences observed for the model and the consequences actually experienced by the observer-learners. These studies typically demonstrate that the addition of direct reinforcement does not significantly increase imitation beyond levels produced by vicarious reinforcement alone. If vicarious reinforcement is conceptualized as stimulus which has acquired discriminative properties, it is not surprising to find that it will evoke imitative responding, at least for a while, in the absence of direct reinforcement.

Several experiments which employ both vicarious and direct reinforcements are not subject to the limitations of the studies described above. These studies include at least one experimental group in which there is a discrepancy between the consequences observed for the model and the consequences received by the experimental subjects. In a study by Mausner & Bloch (1957) one group
of subjects saw a model, their "partner" in a judgmental task, infrequently reinforced. Conversely, the subjects were directly reinforced on 30 of 35 judgmental responses. In a subsequent test for imitation (convergence of estimations between subjects and partners), it was shown that subjects in this condition did not imitate their unsuccessful partners.

In a study by Chalmers, Horne and Rosenbaum (1963) subjects observed a model reinforced either 80 percent of the time (High model competence) or 20 percent of the time (Low model competence) for guessing the outcomes of imaginary horse races. All subjects received reinforcement on 80 percent of the trials for matching the model's response regardless of the outcomes for the model. Although there was a greater tendency to imitate a competent model, after repeated trials the subjects came to match the responses of the model regardless of whether the model was competent (i.e., reinforced) or incompetent (i.e., non-reinforced).

Two other studies using the same procedure (Rosenbaum et al., 1962; Rosenbaum & Tucker, 1962) reported similar findings for the acquisition of imitation. In addition, these two studies also employed a reversal design. After an acquisition block of trials in which the subjects were reinforced for imitation, the contingencies were reversed and subjects were reinforced for non-imitative responses. The results indicated that subjects not only learned to
imitate incompetent models but also to non-imitate competent ones. A study by Sherman et al. (1970) also demonstrated that mismatching as well as matching of modeled behaviors can be developed using extrinsic reinforcement.

Finally, in a study by Marlatt (1970) subjects participated in an experiment on verbal behavior in an interview setting in which some groups were exposed to discrepancies between direct and vicarious consequences. The subjects were randomly assigned to one of twelve experimental conditions. Six of these groups experienced a discrepancy between the consequences which they observed for a model who engaged in discussions of "personal problems" and the consequences they actually received for similar responses in a subsequent interview. Two of these groups heard the model reinforced and subsequently were themselves punished or neutrally evaluated. Two groups heard the model neutrally evaluated and were later reinforced or punished themselves. Finally, two of the groups heard the model punished and were themselves either reinforced or neutrally evaluated.

The results of this study showed a significant main effect for both vicarious and direct consequences; however, the data were presented in such a way that it was impossible to determine if the vicarious reinforcement effect was maintained across blocks of trials for the six groups in which there was a discrepancy between
vicarious and direct reinforcements or whether vicarious reinforcement effects may have contributed to an initial difference between groups which was subsequently negated by the subjects' exposure to directly experienced consequences.

All of the studies cited above demonstrated that the consequences experienced by experimental subjects alter the way in which consequences observed for a model (i.e., vicarious reinforcement) effect imitation. However, none of these studies was designed to determine whether extrinsic reinforcement for imitation is necessary for the maintenance of vicarious reinforcement effects across several trials. It has been argued throughout this paper that stimuli which precede a response have acquired the capacity to differentially control responding through the process of stimulus control. Consequences delivered to a model, it was argued, represent nothing more than discriminative stimuli. Thus vicarious consequences would not be expected to differentially control imitative responses for long if there were a discrepancy between the consequences observed for a model and the consequences actually experienced by the observer-learner. Instead, we would expect that the observer-learner would eventually come to respond in accordance with the external realities. We would not expect this change to take immediate effect. Therefore, studies investigating the relationship between observed and directly experienced consequences would
require repeated exposure to the modeling sequence.

To this author's knowledge, no experiments have attempted to systematically determine whether a high correspondence between observed and directly experienced consequences is necessary for the maintenance of vicarious reinforcement effects across repeated exposures to a model. The study reported here is an attempt to investigate this relationship between vicarious and direct reinforcement.

This study employs the third method of controlling for prior learning suggested by Gewirtz (1971b) as a paradigm for investigating this relationship. The contingencies presumed to exist in the natural environment are rendered inoperable for some of the experimental subjects across repeated exposures to vicarious consequences. This manipulation should reveal that a high correspondence between observed and experienced consequences is necessary for the maintenance of vicarious reinforcement effects. It should also demonstrate the necessity of controlling for prior learning in investigations of vicarious reinforcement and observational learning. Finally, this study also attempts to demonstrate the utility of the conditional responding paradigm of Gewirtz as an alternative explanation of these phenomena and thus to re-open these issues for constructive debate.
Hypotheses

Following the conditional responding theory of Gewirtz (1971b), if we assume that the consequences observed for a model have acquired discriminative properties through prior association with direct reinforcement, then the following hypotheses can be generated.

1. If a subject (O, observer) observes a model (M) receive consequences, O's imitation of M will be discriminative with respect to the observed consequences.

   1-a. If O observes M receive positive reinforcement, the probability of imitation will be greater than if M were punished or not consequated.

   1-b. If O observes M receive no consequences, the probability of imitation will be greater than if M were punished but less than if M were reinforced.

   1-c. If O observes M receive punishment, the probability of imitation will be less than if M were reinforced or not consequated.

2. If there is a discrepancy between the consequences observed for M and the consequences actually experienced by O, O will come to respond in accordance with the consequences directly experienced.

   2-a. If O is continuously reinforced for imitation, the
2-b. If O is not consequated for imitation, the probability of imitation will decrease regardless of the consequences observed for M.

2-c. If O is continuously punished for imitation, the probability of imitation will decrease, regardless of the consequences observed for M.

3. If O receives consequences consistent with those observed for M, imitation will be discriminative.

3-a. If O observes M receive reinforcement and is subsequently reinforced for imitation, the probability of imitation will increase.

3-b. If O observes M receive no consequences and is subsequently not consequated for imitation, the probability of imitation will decrease.

3-c. If O observes M receive punishment and is subsequently punished for imitation, the probability of imitation will decrease.

In summary, it is hypothesized that so long as there is no discrepancy between the consequences observed for the model and the consequences experienced by the subjects for imitation, the subjects will continue to respond in accordance with the discriminative properties of the consequences delivered to the model.
However, when there is a discrepancy between the observer and experienced consequences, the subjects will come to respond in accordance with the consequences which they actually experience for imitation.
CHAPTER VI

Method

Subjects

The subjects (O's, observers) were 20 boys and 20 girls enrolled in Michigan Young World, a pre-school and day care center in Kalamazoo, Michigan. The O's ranged in age from three to six years, with a median of four years and a mean of 4.4 years. The O's were randomly assigned to one of four experimental conditions, with separate assignments for each sex to assure a proportional distribution of males and females to each of the treatment conditions.

One adult male experimenter (E) conducted the study for all 40 children.

Experimental Setting

The experiment took place in an 8 x 12 foot semi-darkened room with no windows. Everything was removed from the room to avoid distracting O's attention from the experimental task. Along the wall opposite the door was a Beseler, model #7750 TH, overhead projector. To the left of the projector was a chair for O. To the right of the projector was a chair for E and a Panasonic, model #NV-8100, videotape recorder. On a small table, directly in front
of the projector, was a bowl used for dispensing and removing Gaylord Animal Crackers used as reinforcers. On the back side of the door to the room was a screen upon which were projected images from the overhead projector. To the right of the screen, directly opposite the O's chair, was a videotape monitor on which the O's viewed the sequence of modeled tasks on the videotape.

Modeled Task

The sequence of responses performed by M and the contingent delivery of consequences to M for these behaviors were presented to the S's via videotape. This videotape depicted a six-year-old girl (M) sitting in a semi-darkened room viewing images projected on a screen in front of her by an overhead projector immediately to her right. An adult, male experimenter (E) was seated on the opposite side of the projector. On a small table directly in front of the projector, was a bowl used by E for dispensing and removing animal crackers used as reinforcers.

The task being performed by M involved verbally identifying 90 different objects as they appeared on the screen. Verbal responses were chosen as the modeled behaviors to be matched by the O's for five reasons. First, the topographical similarity between a verbal response by M and a verbal response by O's was relatively easy for E to identify. It was thought that topographically
similar physical responses by M and O would be more difficult for E to identify because of the variety of subtle differences in physical responses that would require E to interpret whether O was truly imitating. Thus it was thought that modeled verbal responses would increase experimenter reliability.

Second, the use of verbal responses greatly facilitated the training of the model. The task did not require any special skills on the part of M other than the ability to read aloud 90 simple, word cues written on slips of paper.

Third, the restricted area of the experimental setting precluded the use of readily identifiable physical responses.

Fourth, the use of verbal responses to be imitated did not require any special skills on the part of the O's beyond the auditory and simple verbal skills characteristic of their age group.

Finally, it was thought that by using verbal responses it could be more easily demonstrated that the O's, if they imitated, were performing a novel discrimination, rather than performing a discriminated response already in their behavioral repertoire. The responses demonstrated by M were not truly "novel" because they did not require O to combine vocal sounds into fictitious words (i.e., as in nonsense syllables). Labels were assigned which probably existed in the O's verbal repertoires (see description in "Selection of Stimulus Items"). However, labels were picked which
were demonstrated to have a low probability of occurrence under
the specific stimulus conditions. Thus the responses were consid­
ered to be "novel" in the sense that the stimulus items which were
selected to occasion them had a low probability of being discrimina­
tive for such responses in settings external to the experimental
situation.

After each labeling response by M, E would do one of the
following:

1. Reinforce M by dropping an animal cracker into the bowl
and saying something like, "Good, you get a cookie for that."

2. Punish M by removing a cracker from the bowl and
making a statement like, "No, I'm afraid you lose a cookie for that
one."

3. Pretend to ignore M by attending to his notebook, provide
no consequences, and after 20 seconds proceed to the next projected
object.

The 90 pictured objects were randomly assigned to one of
three model consequence conditions described above so that on 1/3
of the modeled tasks M was reinforced, on 1/3 M was punished, and
on 1/3 M received no consequence.
Selection of Stimulus Items

The choice of stimulus objects to be presented on the overhead projector for identification was made on the basis of criterion considered crucial to the results of this experiment. First, the object had to be ambiguous enough so that there were a variety of verbal labels which could be considered appropriate to describe it. If the O's were asked to identify an object with only one or two "appropriate" labels, it was thought that this would increase their probability of imitating M because they lacked an alternative response in their verbal repertoire. Also, if the object was not ambiguous enough for several labels, the "correctness" of O's label might have been more reinforcing than any of the experimental consequences.

For the same reasons the object could not be too ambiguous. If the O's were not familiar with the object at all, the probability of imitation would be expected to increase because the O's lacked an appropriate alternative response. Therefore, it was decided to pretest the series of stimulus objects for use in the experiment.

The subjects (S's) for the pretest were 50 boys and girls from Michigan Young World (North Street Annex) between the ages of three and five years with a median of four years and a mean of 4.2 years. The S's, who volunteered, were tested individually by E.
Each S was led into a semi-darkened room which contained a projector screen, an overhead projector, and two chairs, one to each side of the projector. Each S was requested by E to be seated and to identify the pictures he was about to show them. S's then viewed a series of 120 different objects and E recorded S's verbal responses. At the end of the sequence, E thanked S for helping him and handed S a package containing 10 animal crackers.

The 120 pictures used as stimulus objects were selected from the 3M series of Thermofax Transparency masters and prepared for the overhead projector using a 3M Thermofax Copy Machine. E selected 120 pictures from the 3M series which appeared to meet the criterion for ambiguity; and after the pretest, selected 90 of these for use in the experiment according to the following criterion:

1. The stimulus object must have been labeled with at least four different words by the pretest S's.

2. The stimulus object must have been labeled with no more than eight different words by the pretest S's.

The pretest results were also employed to select the word which M would use to label each of the stimulus objects. The fourth most frequently occurring response by the S's was chosen as the modeled response for two reasons. First, the selection of a label with a relatively low probability of occurrence should increase
the likelihood that the O's had, as part of their verbal repertoire, an appropriate alternate response with which to label the stimulus (i.e., the more frequently occurring pretest labels). Second, it should increase the probability that, if the O's made the same response, that response was actually under the stimulus control of the model rather than a previously learned response under the control of the stimulus object.

The 90 stimulus objects were then randomly assigned to the three model consequence conditions and to the position in which they appeared in the sequence of presentation.

Procedure

The children were individually escorted into the experimental setting by E, during which time E introduced himself. Upon entering the experimental chamber, E requested O to be seated to the left of the overhead projector and seated himself to the right of the projector. Next E explained the experimental task to O saying: "_____________(child's name), I want you to watch the TV over there (pointing to the VTR monitor). Each time the TV show stops, I will show you a picture over here (pointing to the projector screen). I want you to tell me what each picture is." O was then asked to reiterate to E what was expected of him. If O could not do so the task was explained again. When O was able to verbally demonstrate
understanding of the task, E began the experiment.

The video tape recorder was switched on and O was allowed to view the first sequence of the modeled task. As soon as E had con-sequated M for identifying the projected stimulus object, the recorder was switched off. E directed O's attention to the stimulus object on the projection screen in the experimental chamber and asked: "Now __________ (child's name), can you tell me what this is?" If O did not verbalize a response within 20 seconds, E again probed O to label the stimulus object. E coded O's responses on a data sheet as either imitative or non-imitative.

For the first nine trials of the experiment, E did not provide consequences to O for imitative responses. This was done to pro-vide an opportunity to assess whether the responses predictable from the vicarious reinforcement paradigm (i.e., Hypotheses 1, 1-a, 1-b, and 1-c) were occurring prior to the experimental manip-ulations for each O. In order to insure an equal distribution of vicarious consequences in these nine trials, three of each of the vicarious consequence conditions were randomly assigned to this initial sequence. However, due to this randomization procedure, O's observed M receive reinforcement on the first three exposures to the video tape. It was not known how this would bias O's subse-quent responding. Therefore, half of the O's began the experiment at the thirty-eighth trial sequence on the video tape. The first nine
trials beginning at this point also contained an equal distribution of the three vicarious consequence conditions, but M received punishment on the first three trials of this sequence.

At the end of the ninth trial E dropped several animal crackers into the bowl in front of the projector saying: "If you do good from now on, you can take some cookies with you when we're through." On trial ten E began the experimental manipulations, which were designed to test Hypotheses 2 and 3.

Reinforcement condition. The following experimental manipulation was implemented to test Hypothesis 2-a which predicted an increased probability of imitation when O is continuously reinforced regardless of the consequences observed for M. Beginning on the tenth trial, the subjects in group I (CR) were placed on a schedule of continuous reinforcement for imitative responses. Each time O labeled a stimulus object with the same word which M used on the video tape, E would drop one animal cracker into the bowl and verbally praise O. E was careful in his verbal praise to use only words such as "good," "very good" or "excellent." Praise words such as "right" or "correct" which might connote appropriateness of the response were avoided. If O labeled the stimulus object with a non-imitative response, E said nothing but simply recorded the response and proceeded to the next trial. This procedure was followed for the remainder of the experimental trials. At the end of the experiment,
E removed the crackers from the bowl, ostensibly to put them in a container for O. O was given a bag containing 25 animal crackers, thanked for his cooperation and allowed to leave the experimental setting.

**No consequence condition.** This condition was implemented to test Hypothesis 2-b which predicted a decreased probability of imitation when O's received no consequences for imitation. Group II (NC) O's began the experimental sequence with 25 crackers. The O's in this group received no consequences for imitative responses. E simply recorded O's response and proceeded to the next trial. Upon completion of the task, E thanked O and dismissed him with a bag of 25 crackers.

**Punishment condition.** This experimental manipulation was designed to test Hypothesis 2-c which predicted that if O's were continuously punished for imitation, the probability of imitation would decrease. The children in group III (CP) began the experimental trials with 30 animal crackers in the bowl. This was done so that E could punish O's imitative responses by removing crackers from the bowl. O's in this condition were placed on a schedule of continuous punishment for imitation. Every time O imitated M's labeling response E removed a cracker from the bowl and verbally punished O saying such things as: "That was bad!" or "That was not so good." If O's response was non-imitative E simply recorded it.
and went on to the next trial. At the end of the experiment E dismissed O with a bag of 25 crackers saying: "You really did good, __________ (child's name), thank you for helping me."

**Same consequence condition.** This condition tested Hypotheses 3, 3-a, 3-b, and 3-c. These hypotheses predicted that O's which received consequences similar to those which they observed for M would differentially imitate M in accordance with the consequences observed for M. The O's in group IV (SC) received 10 animal crackers in the bowl prior to the experimental trials. Subjects in this condition, if they imitated, received the same consequence which they observed M receive on the video tape. If O observed M being reinforced for a response and then labeled the stimulus object with the same response, E dropped a cracker in the bowl and verbally praised O. If O imitated a response for which M had received punishment, E removed a cracker and verbally punished O. If O imitated a response for which M had received no consequence, E recorded it and proceeded to the next trial. All non-imitative responses by O were recorded and no consequences were provided. At the end of the experimental sequence, O was given a bag of 25 animal crackers, thanked for his assistance, and allowed to leave the experimental room.
CHAPTER VII

Results

Preliminary analysis did not reveal any significant differences between subjects who began the experiment with the first videotaped sequence and subjects who began in the middle of the videotape. Therefore, the data for these groups were combined for analysis.

Figure 2 shows the results of the test for Hypothesis 1. Recall that Hypothesis 1 predicted that S's would discriminatively imitate M in accordance with the consequences observed for M. Specifically, imitation would be most frequent when M was reinforced, less frequent when M was not consequated, and least frequent when M was punished. The findings generally support this hypothesis. Figure 2 shows the mean number of imitative responses for all subjects for the first nine trials and the last nine trials of the experiment.

Prior to the experimental treatments, imitation was most frequent when M was reinforced, somewhat less when M was not consequated, and least when M was punished. However, after exposure to direct consequences this discriminative responding

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disappeared. Comparison of the means by t tests (Table 1) revealed that the initial difference between the model-reinforced and the model-no-consequence conditions was not statistically significant.

When M was either reinforced or not conseuated, S's imitated significantly more than when M was punished. After S's experienced repeated trials with direct consequation, there were no significant differences between the vicarious consequence conditions.

Further analysis revealed that vicarious consequences lost their ability to control imitation because the consequences actually experienced by S's came to exert control over imitation. Hypothesis 2 predicted that when there is a discrepancy between the consequences observed for M and the consequences actually experienced by S, S will come to respond in accordance with the directly experienced consequences. The data for the different experimental groups strongly support this hypothesis.

Figure 3 shows the percentage of imitative responses across blocks of trials for S's on group I. These S's were continuously reinforced for imitation regardless of the vicarious consequences they observed. On the first block of trials subjects discriminatively
imitated in accordance with the vicarious consequences. However, after repeated exposure to direct reinforcement, S's came to imitate M regardless of the vicarious consequences.

Figure 4 shows the percentage of imitative responses across blocks of trials for S's who were never consequated for imitation. Again, imitative responding on the initial block of trials is discriminated in accordance with the vicarious consequences. However, as proposed by Hypothesis 2-b, imitative responding was substantially reduced when S's matching responses went unreinforced for repeated trials. There was not a reduction in responding for the vicarious punishment condition in which the percentage of imitative responses was initially suppressed. The pattern of responses for this group was markedly erratic, consistent with the typical pattern for responding in extinction.

Insert Figure 4 about here

Figure 5 shows the percentage of imitative responses across blocks of trials for S's who were continuously punished for imitation. As with the other groups, on the initial trials S's imitation was under control of vicarious consequences. Again, after exposure to direct consequences, the punishing consequences came to control responding. By the tenth block of trials S's had completely ceased imitating under all vicarious consequence conditions. The three preceding
groups demonstrated that when there is a discrepancy between observed and directly experienced consequences, S's come to respond in accordance with the directly experienced consequences.

Figure 6 shows what happens when there is no discrepancy between vicarious and directly experienced consequences. This figure shows the percentage of imitative responses across blocks of trials for S's who received the same consequence, contingent on matching responses, which they had observed the model receive. As with the other groups, on the first block of trials imitation was most frequent under vicarious reinforcement, somewhat less frequent under no vicarious consequence, and least frequent under vicarious punishment. However, unlike the other groups, this difference was maintained across blocks of trials. In fact, the difference between the vicarious consequence conditions became more pronounced across trials. As proposed in Hypothesis 3-a, when S's were both vicariously and directly reinforced, the probability of imitation increased. The combination of direct extinction and no vicarious consequence resulted in a decreased probability of imitation. This was predicted by Hypothesis 3-b. Again note the
erratic pattern of responding. When S's observed vicarious punish-
ment and were subsequently punished for imitation, the probability
of imitation decreased, as predicted in Hypothesis 3-c.

The above analysis showed that when there was a prolonged
discrepancy between vicarious and directly experienced conse-
quences, S's eventually came to respond in accordance with the
direct consequences. However, when there was no discrepancy, S's
imitation remained under control of the vicarious consequences.

The addition of direct consequences enhanced this control.
CHAPTER VIII

Discussion

The primary purpose of this experiment was to determine whether direct reinforcement is necessary for the maintenance of vicarious reinforcement effects. It was reasoned that, if it could be demonstrated that vicarious reinforcement phenomena were not anomalous to operant conditioning theory, then, such evidence could be considered supportive of Gewirtz's (1971b) conditional responding paradigm for observational learning.

Following this paradigm, it was argued that consequences delivered to a model represented nothing more than a specific type of discriminative stimulus. That is, vicarious consequences had acquired the ability to differentially occasion responding through their prior association with directly experienced consequences. It was maintained that if vicarious consequences were nothing more than S-D's, it would require a high correspondence between the observed and directly experienced consequences for the vicarious consequences to retain their discriminative properties. The results of this study strongly support this conditional responding paradigm for vicarious reinforcement.

Beginning with the assumption that vicarious consequences are
$S^D$'s, we would expect that, in the natural environment, imitation of a model would be most frequently reinforced when the behaviors to be imitated also procure favorable consequences for the model. Thus, we would expect that observer-learners would most frequently imitate a model who is reinforced.

Similarly, we would expect that the imitation of modeled responses which are punished would frequently lead to punishment from the social community. Therefore, imitation should be least frequent when the model is punished. This is exactly what was observed on the initial block of trials for all groups in this study.

When the model is not consequated the predictability of imitation is complicated considerably. What this amounts to is the elimination of a very powerful discriminative stimulus. When this happens other salient stimuli from the modeling situation come to exert more powerful control over imitation. When the model is not consequated imitation would be expected to be less probable than if the model were reinforced but more probable than if the model were punished. However, when other stimuli indicate to the subjects that they will be required to perform the same task as the model, the pressure toward imitation would be expected to increase. This would be especially true when the task, as in the case of this study, is unfamiliar to the subjects and relatively ambiguous.

In a review of the literature on vicarious reinforcement
Thelen and Rennie (1972) concluded that one of the most salient variables in vicarious reinforcement phenomena is this "expectancy to perform." Thus, it appears that the initially high frequency of imitation in the absence of vicarious consequences may be attributable to an artifact of the experimental design (i.e., the subjects knew they would be required to perform the task).

If, as has been proposed, vicarious consequences have acquired their discriminative properties through an association with directly experienced consequences, we would expect that only when there is a continued correspondence between observed and direct consequences will these discriminative properties be retained. Whenever there is a prolonged discrepancy between vicarious and direct consequences we would expect that the vicarious consequences would either lose their discriminative properties or become discriminative for mis-matching the model. The results of this study provide convincing support for the above proposals.

In only one of the experimental groups did vicarious consequences continue to control imitation across trials. This was the "same-consequence" group in which there was perfect correlation between vicarious and direct consequences. Subjects in the remaining three groups experienced a consistent discrepancy between vicarious and direct consequences. In all three of these groups subjects quickly learned to respond in accordance with the direct
contingencies.

Of particular interest is the group of subjects who were never directly consequated for imitation. In the other two groups it could be argued that direct consequences simply exerted greater control over responding than the vicarious consequences. However, in this group there were no direct consequences; therefore, the failure of vicarious consequences to maintain discriminative responding could not be attributed to their relative weakness in comparison to direct consequences.

Although the results of this experiment lend strong support to stimulus control interpretation, they cannot be considered definitive proof that the operant conditioning explanation is the "correct" interpretation. A social learning theorist could argue that the vicarious consequences no longer conveyed accurate information about existing environmental conditions and thus, subjects were not motivated to imitate.

However, what is readily apparent is that even the social learning theory explanations for vicarious reinforcement require that there be a high correspondence between observed and directly experienced consequences for the maintenance of vicarious reinforcement effects. Therefore it appears that direct reinforcement is a necessary condition for vicarious reinforcement phenomena for both operant conditioning and social learning theories.
Since the conditional responding paradigm of Gewirtz (1971b) does not require cognitive constructs, we have argued in favor of it as an explanation of vicarious reinforcement and observational learning phenomena. As was pointed out earlier in this paper, the "representational mediation" process of social learning theory is unobservable and cannot be measured independent of the behaviors which it is proposed to explain. Furthermore, the inclusion of these cognitive constructs adds nothing to the explanatory and predictive power of operant conditioning theory. Therefore we argue in favor of the more parsimonious conditional responding paradigm of Gewirtz (1971b) as an explanation of vicarious reinforcement and observational learning phenomena.

Suggestions for Further Research

This experiment, although specifically designed to investigate vicarious reinforcement effects, also attempted to deal tangentially with the phenomena of observational learning. It was primarily for this reason that the pretest was performed to choose the words which the model used to label the stimulus items. It was reasoned that if the subjects imitated low-probability labels that this would constitute a demonstration of observational learning. However, two things cast suspicion on this line of reasoning. First, as was pointed out earlier in this paper, in order for observational learning
to be inferred it must be demonstrated that the modeled response did not already exist in the behavioral repertoire of the observer-learner. The use of a pretest employing a different population of subjects may increase the probability of choosing novel responses as labels for stimulus items, however it does not allow for a definitive demonstration that the responses are novel for the experimental subjects. An acceptable alternative might be to pretest the same population of subjects as will be employed in the experiment and to label the stimulus objects with words not used by any of the subjects. Only in this way could it be conclusively demonstrated that the modeled behaviors constitute novel responses.

Second, this experiment did not include any specific tests for observational learning. From the results of this study it might appear that only subjects who were reinforced learned significantly. However, the social learning theorist would argue that all of the subjects may have learned the modeled responses but those who were not reinforced were not sufficiently motivated to perform the responses. This possibility cannot be ruled out because there were no attempts to motivate these subjects to perform the behaviors.

A suggestion for further research might be the inclusion of a sequence of responses to test for observational learning. As in the study by Bandura (1965a), at the conclusion of the experimental trials, subjects could be exposed to a sequence of stimulus objects.
and instructed that they would be reinforced each time they named the object as the model had done in the experimental trials. However, even the results of such a test would be inconclusive as long as experienced subjects were employed for the experiment. As was suggested earlier, the only possible way to definitively answer the controversies about observational learning may be to employ subjects whose conditioning history has been rigorously assessed from birth.

Nevertheless, studies of observational learning which do not employ adequate controls for prior learning must be viewed with suspicion. As was demonstrated by this experiment, learning processes which appear to be primary may in actuality be an outcome of learning by direct experience. Therefore, conclusions about the primacy of observational learning are premature. The issue must be considered almost as open now as when the controversy first appeared at the turn of the century.
Table 1

$t$-Test Comparison of Pairs of Means
Between Treatment Conditions

<table>
<thead>
<tr>
<th>Model Consequence Conditions</th>
<th>t-Value</th>
<th>t-Value</th>
<th>t-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reward vs. No Consequence</td>
<td>1.494</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reward vs. Punishment</td>
<td>7.369*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Consequence vs. Punishment</td>
<td>5.873*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Before Exp. Treatments

- Reward vs. No Consequence: 1.494
- Reward vs. Punishment: 7.369*
- No Consequence vs. Punishment: 5.873*

After Exp. Treatments

- Reward vs. No Consequence: 1.110
- Reward vs. Punishment: 1.863
- No Consequence vs. Punishment: 0.819

* $p < .001$
Figure 1
Component Processes Governing Observational Learning in the Social Learning Analysis (Bandura, 1977)

<table>
<thead>
<tr>
<th>Modeled Events</th>
<th>Attentional Processes</th>
<th>Retention Processes</th>
<th>Motor Reproduction Processes</th>
<th>Motivational Processes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Modeling Stimuli</td>
<td>Symbolic Coding</td>
<td>Physical Capabilities</td>
<td>External Reinforcement</td>
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<td>Distinctiveness</td>
<td></td>
<td>Cognitive Organization</td>
<td>Availability of Component Responses</td>
<td>Vicarious Reinforcement</td>
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<tr>
<td>Affective Valence</td>
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<td>Symbolic Rehearsal</td>
<td>Self-Observation of Reproductions</td>
<td>Self-Reinforcement</td>
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<td>Complexity</td>
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<td>Motor Rehearsal</td>
<td>Accuracy Feedback</td>
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<td>Observer Characteristics</td>
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<td>Functional Value</td>
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<td>Sensory Capacities</td>
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<td>Arousal Level</td>
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<td>Past Reinforcement</td>
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</tbody>
</table>

Matching --> Performances
Figure 2
Mean Number of Imitative Responses Prior to and After Exposure to Directly Experienced Consequences

Prior to Direct Consequences

After Direct Consequences

Mean Number of Imitative Responses

Vicarious Reinforcement

No Vicarious Consequences

Vicarious Punishment

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Figure 3
Percentage of Imitative Responses by Blocks of Trials for Continuous Reinforcement

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Figure 4
Percentage of Imitative Responses by Blocks of Trials for No Consequences

- △ No Vicarious Consequences
- ○ Vicarious Reinforcement
- □ Vicarious Punishment

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Figure 5

Percentage of Imitative Responses by Blocks of Trials for Continuous Punishment

- No Vicarious Consequence
- Vicarious Reinforcement
- Vicarious Punishment

Percentage of Imitative Responses

Blocks of Trials
Figure 6

Percentage of Imitative Responses by Blocks of Trials for Same Consequence

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References


