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ESTABLISHING REINFORCING PROPERTIES IN NEUTRAL  
STIMULI THROUGH OBSERVATIONAL  
LEARNING WITH CHILDREN

by

Andrew Waine Gardner

A thesis submitted in partial fulfillment  
of the requirements for the degree

of

MASTER OF SCIENCE

in

School Psychology

Approved:

UTAH STATE UNIVERSITY  
Logan, Utah

2001

## ABSTRACT

Establishing Reinforcing Properties in Neutral  
Stimuli Through Observational  
Learning with Children

by

Andrew Waine Gardner, Master of Science  
Utah State University, 2001

Major Professor: Dr. Gretchen A. Gimpel  
Department: Psychology

The purpose of this study was to observe and analyze the factors that lead to a child's increase in responding to a previously neutral stimulus, after observing another child's behavior and consequences in the same setting. The effects of five video presentations on rate of button-pressing responses were observed across four students. Rates of button-pressing behavior on an FR3 schedule of reinforcement were collected for each student using a computer and a metal apparatus with two flat push buttons. Each student completed two baseline phases to establish neutrality of stimuli, and viewed a total of five video presentations. Each video segment contained a model engaging in button pressing and receiving tokens under various social and nonsocial conditions, which would potentially serve as reinforcers. Rates of responding were recorded immediately after each video presentation. Three of the four students' rates of responding increased and surpassed their levels of responding during baseline sessions. From these results, it was concluded that neutral stimuli can acquire reinforcing properties for children through an observational learning procedure. It is suggested that observational learning (the presentation of a model engaging in a specific behavior) might be considered an establishing operation to temporarily increase the value of a reinforcer.

(49 pages)

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Andrew Waine Gardner

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## INTRODUCTION

Humans often learn through the observation of others under specific circumstances. Children especially attend to behaviors and consequences of others and often imitate those behaviors that they see others exhibiting. The classroom is one setting in which observational learning may be particularly relevant. Research shows that teaching strategies that incorporate observational learning or imitation can be extremely effective. For example, reinforcing students vicariously for attentive behavior has been shown to increase this behavior in the classroom. This strategy has effectively increased attentive behavior in adjacent peers, upon reinforcement of target students (Kazdin, 1973). Observational learning can also be used as part of a behavior management program in the classroom. When students are seen working diligently and receiving praise, and other students find praise reinforcing, this may increase the probability that other students will engage in the same behavior to obtain praise. Observational learning not only has educational implications, but also has implications for behavior therapists in clinical settings (Masia & Chase, 1997). Imitation in a clinical setting can be used to establish new and appropriate behaviors and decrease inappropriate behaviors. For example, using imitation with children with autism has been shown to be an effective technique to establish and increase verbal repertoires (Baer, Peterson, & Sherman, 1967).

The process in which an observer sees a model's behavior and the consequences of this behavior are the fundamentals of observational learning. Research indicates that if an observer sees a model (with certain characteristics) behave, and observes reinforcing consequences (the model is positively reinforced), there is a high probability that the behavior will be imitated by the observer (Chance, 1994). Consequences that are reinforcing are a vital part of predicting whether or not a behavior will be imitated. Positive reinforcement is an operant conditioning procedure that is used in the classroom, and in many other situations, to increase or maintain rates of responding. For example, when a student correctly raises his/her hand in class, waits to be called upon, and answers a question, a teacher praises that student (positive reinforcement) for this sequence of behaviors. This is an effective way to establish and maintain acceptable behavior in the classroom. One of the difficult aspects in using reinforcement to increase behaviors is the identification of



specific reinforcers. A reinforcer is only functional if it increases or maintains the rate of responding upon which it is contingent.

Students find reinforcing value in many different stimuli, whether they are unconditioned reinforcers such as food, candy, and so forth, or conditioned reinforcers such as money, pencils, coupons, tokens, and so forth. A problem occurs when one stimulus in a classroom setting has reinforcing value to one student, which maintains or increases the rate of response of his/her behavior, but other students do not find reinforcing value in the same stimulus. This may lead to differences in rates of performance in different students' behavior or necessitate the use of many different reinforcers that may be impractical in a classroom setting. In a group setting such as a classroom, reinforcement is given by the teacher and other students. If neutral stimuli can acquire reinforcing value through observational learning, then it would be simple to implement a procedure in which children would come to regard the same stimuli as reinforcing. Many studies report increasing specific behaviors (i.e., question asking and answering, mathematic performance, motor skills, language skills, seek adult assistance, and attentive classroom behavior) of an observer with the use of a model (Baer et al., 1967; Christensen, Lignugaris/Kraft, & Fiechtl, 1996; Ferrari, 1996; Goldstein & Hockenberger, 1991; Kazdin, 1973; Knapczyk, 1991; Wood, Rosenberg, & Carran, 1993), but there have been no specific investigations reporting whether or not a specific neutral stimulus can acquire reinforcing value or properties through observational learning with children.

The primary purpose of this study was to investigate whether a neutral stimulus can acquire reinforcing properties or value through the observational learning process. If a child at first does not find a neutral stimulus reinforcing (does not maintain or increase the rate of responding), but then sees another child receiving that same stimulus and enjoying it (demonstrating reinforcer value), will this stimulus then acquire reinforcing properties? This study attempted to determine whether a stimulus, which does not have any reinforcing properties (or does not produce a high rate of responding), will become reinforcing (maintain or increase the rate of responding) through observational learning with four students.

## LITERATURE REVIEW

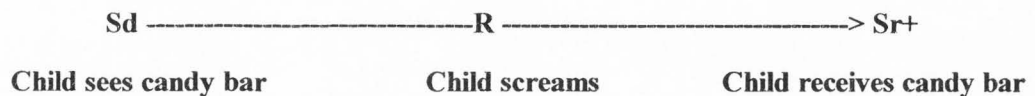
### Basic Principles of Operant Conditioning

When attempting to increase behavior in a classroom, home, clinic, or any other setting, positive reinforcement is one of the most effective techniques to use. This basic principle of learning has been described by many different scientists throughout history, but was first scientifically researched and described by Edward Lee Thorndike with animal studies. Thorndike did some of the first experiments from which he proposed a principle he called "The Law of Effect." According to Keller and Schoenfeld (1950), "Thorndike meant...that the effect of food (reinforcer) was to increase the frequency (rate) of the response that produced it...to define positive reinforcers as those stimuli which strengthen responses when presented (e.g., food strengthens bar-pressing or loop pulling behavior)" (p. 61). B.F. Skinner later built upon the findings of Thorndike, defined, and wrote about more specific operant principles such as positive reinforcement, negative reinforcement, punishment, schedules of reinforcement, and so forth.

Basic operant principles can be defined as procedures that increase or decrease behaviors. In all organisms we see excesses and deficits in behavior. We might say that when a child speaks too much in class, an excess in speaking behavior is observed, and we might say that when a child is too quiet, a behavioral deficit in speaking behavior is observed. In order to increase or maintain specific behaviors, we can use either positive or negative reinforcement in the child's environment. With positive reinforcement, a stimulus increases or maintains the rate of response upon which it is contingent. In other words, when a response is made and a reinforcing stimulus or event is then presented, there is a high probability that the response will occur again in a similar situation. A classroom example would be teacher praise for completed work. If a student completes his/her work, and the teacher praises the child for turning it in, there is a high probability that the student will continue to do the same in the future. With negative reinforcement, when a stimulus is removed, the rate of response upon which it is contingent increases. Negative reinforcement is also referred to as escape because an organism is escaping from an aversive stimulus. An example of this principle would be an alarm clock. To increase getting up in the morning, the removal of (or

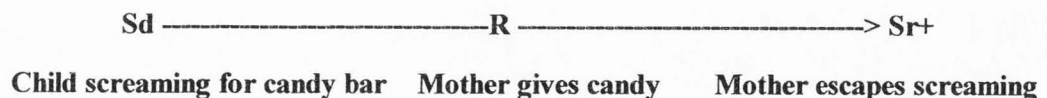
turning off) the buzzing of the alarm clock is used. The buzzer is not a pleasant stimulus, and it is negatively reinforcing getting out of bed to turn off the clock. This is a term that is often confused with punishment. Punishment is defined as the delivery of a stimulus that decreases the rate of responding upon which it is contingent. The main distinction between punishment and negative reinforcement is that one increases behavior and one decreases behavior. Punishment decreases behavior. For example, spanking a child is considered punishment and is often used (unfortunately) in attempts to quickly decrease or stop behavioral excesses.

Skinner also diagramed antecedents, behaviors, and consequences using the three-term contingency (Sd---- R---->Sr+). Sd is a symbol used to represent a discriminative stimulus that will always be reinforced, R stands for a response or behavior, and Sr+ signifies positive reinforcement. An example of this would be an interaction between a child and a mother in a grocery store. A child might start screaming and asking for a candy bar and a mother might give it to him/her. Diagramed in a three-term contingency it looks like this:



According to the definition of positive reinforcement, there is a high probability that this child will respond in the same way (scream) next time he/she is in the grocery store and sees a candy bar.

The mother is also negatively reinforced for giving her child a candy bar in the grocery store. This can be diagramed like this:



According to the definition of negative reinforcement, there is a high probability that the next time her child screams for a candy bar in the store (aversive), she will respond the same way (escape), and give the child what he/she wants.

These are just a few commonly used principles of operant conditioning. Skinner researched these principles using an experimental analysis of behavior, primarily measuring rates of responding under specific environmental conditions.

### Experimental Analysis

Experimental analyses are inductive methods of conducting science. Inductive approaches to philosophy and science have been used since the days of Aristotle. Using objective observations and data to conduct scientific experiments and find truths is one of the foundations of the inductive method. In contrast, a deductive approach uses a theory as a basis for experimentation, and tests the truth of that theory as the experiment. In other words, in an inductive approach, one attempts to gather data from inquiries based on general principles (Chiesa, 1994). Skinner explained it best when he said that an experimental analysis of behavior is an empirically based assault on the environmental variables (that are possible to manipulate) of which behavior functions (Skinner, 1972). With an experimental analysis of behavior, it is possible to show a cause-and-effect relationship between the independent variable and the dependent variable, and it is more than testing a hypothesis. This is different than a statistical analysis, which does not show a direct cause-and-effect relationship between an organism and the environment. With hypothesis testing, the researcher asks, "Is this theory true (or approximately true)?" With an experimental analysis, the researcher asks, "I wonder what would happen if..." (Sidman, 1960, p. 8), and the experimenter manipulates the variables upon which the behavior is likely contingent. An inductive approach to science gathers data by manipulating environmental variables and draws conclusions from these data. In other words, the inductive behavior scientist looks for functional relationships between an organism and its immediate environment. A deductive approach to science takes a theory and tries to prove it through collecting data.

Skinner used an experimental analysis approach to study human behavior, primarily using rates of responding as a dependent measure. He defined rate as "the length of time elapsing between a response and the response immediately preceding it" (Skinner, 1938, p. 58). According to Skinner, the rate of responding is the most effective way of measuring operants. Skinner used

rates of responding in most of his behavioral experimentation explaining that the “rate of responding is not a measure of probability, but it is the only appropriate datum in a formulation of these terms” (Skinner, 1950, p. 49). Rate is one of the most accurate and appropriate behavioral measures when conducting a scientific study.

### Origins of Observational Learning

Observational learning is one type of learning that can be analyzed from an operant conditioning paradigm, and can be studied using an experimental analysis of behavior. There are many theories of observational learning, each based on specific philosophical approaches to studying human behavior and function. One of the basic questions about the foundations of human behavior is where it began. Scientists are constantly investigating whether a genetic or biological component is responsible for behavior, whether behavior was learned, or whether a combination of the two led to behavior. The same curiosity holds true with observational learning. Is it possible that imitation is an inherited behavior trait passed on through genes? Could it possibly be a fixed action pattern elicited by a releaser such as the observation of a model? Could this type of learning be a functional innate survival skill? Infants of very young ages have been shown to produce imitative responses, specifically facial gestures to an adult model. In fact, it has been reported that neonates can imitate as young as 0.7 to 71 hours of age (Meltzoff & Moore, 1983). Many other imitative behaviors with infants, such as hand opening (Jacobson, 1979), and expressive behaviors labeled as happiness, sadness, and surprise (Field, Woodson, Greenberg, & Cohen, 1982) have been reported, although there is still some speculation with regard to replication and methodological procedures in some of these studies (Deguchi, 1984; Hayes & Watson, 1981). There is also evidence that older children, ages 7 to 8, learn better than younger children, ages 4 to 5, through observation, especially if they already have the observed behavior in their learning history (Coates & Hartup, 1969).

It is unknown whether or not there is an innate tendency for observational learning to occur with humans. As an infant is born, all environmental input, conditioning of reflexes, and operants fall immediately into his/her behavioral repertoire. A thorough analysis of the history of

reinforcement of many children would have to be tediously monitored to scientifically approach this question. The average person just accepts imitative behavior as inherent and does not think of its origins because their imitative repertoire is so well developed (Skinner, 1953).

One thing we can conclude about imitation is that there is survival value to this type of behavior; also, it is a high probability behavior in the presence of certain stimuli (e.g., a model). Skinner explained that there is survival value in behaving as others behave, but it is difficult to determine whether imitation is innate or learned. "To speak of an instinct of 'imitation' ... is ambiguous; it may refer to contingencies of survival or contingencies of reinforcement" (Skinner, 1974, p. 47). As of today, there are no definitive findings to support a true "nature" basis of this argument.

The other side of this coin is nurture or learned behaviors. Behaviors are learned by an individual as it becomes necessary to adapt to the environment. As with natural selection, functional behaviors are selected out by environmental consequences, and if a behavior is functional, an organism continues to behave in that fashion. If other behaviors are not functional, they are selected out and not repeated. Humans quickly adapt to a continuously changing environment by learning new behaviors; therefore, there is much less need for an innate repertoire. It, then, is apparent that operant conditioning could supplement and actually replace natural selection (Skinner, 1981). In fact, there is evidence that children with disabilities who cannot produce verbal behavior and have no imitative repertoire, cannot imitate speech unless first taught how to imitate. Therefore, as a repertoire of imitative behavior is started, children will generalize this same response (imitation) in similar situations (Baer & Sherman, 1964; Baer et al., 1967; Lovaas, Berberich, Perloff, & Schaeffer, 1966; Metz, 1965). Observational learning is a specific method that facilitates adaptation to a changing environment. Although researchers have investigated this type of learning, there is a great deal of disagreement in theory and analysis of the process.

### Theories of Observational Learning: An Overview

Bandura, through a "social learning theory" perspective, explained that there are two types

of observational learning: imitation and vicarious. Imitation is defined as an observer's topographical match in behavior when compared to a model's behavior. The second type, vicarious learning, occurs as a result of observing a model's behavior and consequences. Bandura also explained how time can pass between the observation of a behavior and the response of the observer (Bandura, 1977). Therefore, it is possible for an observer to emit the behavior even when the model is no longer present. Bandura explained this phenomenon by attributing the cause to internal processes and mechanisms that occur inside the organism. On the other hand, Skinner explained imitation and modeling through an evolutionary and operant conditioning framework. He suggested that behaving as another organism does is not a sufficient explanation of imitation. For instance, a dog chasing a rabbit is not chasing because of imitation, though there is a match in behavior topography. It is also explained that learning through observation occurs in groups, and must have evolved and been selected through consequences over time. He explained that imitation evolves first, then contingencies for selection exist, which should produce modeling in groups (Skinner, 1984). Even though there are different ways to define observational learning, they are all attempts to describe a specific way in which an organism learns by observing another.

### Bandura

The most famous observational learning studies with human subjects came from the work of Albert Bandura. It has been said that between the years 1950 and 1968, studies investigating observational learning increased "ten-fold," and much of this can be attributed to Bandura and his colleagues (Whitehurst, 1978, p. 147). Through his studies, Bandura authored the social learning theory of modeling (Bandura, 1977). The social learning perspective uses two terms to describe and define modeling: vicarious learning and observational learning.

Vicarious learning is broken down into distinct functions: vicarious reinforcement also known as disinhibition and response facilitation (modeling increases the probability of the behavior); and vicarious punishment, also referred to as inhibition (modeling decreases the probability of the behavior). Specifically, Bandura explained the vicarious process as a "change in the behavior of observers as a function of witnessing the consequences accompanying the performance of others" (Bandura, 1971a, p.230). Bandura further explained that there are two

phases of vicarious learning: an acquisition phase and a performance phase. These phases occur as a function of three processes: observation, indirect reinforcement or punishment (vicarious), and cognitive mediation (Masia & Chase, 1997). Bandura has taken basic operant conditioning principles and added a few cognitive processes. This theory is also known as “vicarious learning theory” (Bandura, 1971b).

Observational learning is defined as a situation in which an observer has never performed the response before, but upon observation of a model, makes an identical response (Bandura, 1971b). Bandura proposed that observational learning or modeling consists of four basic process components: attention, retention, motor reproduction, and motivation (Bandura, 1977; Decker & Nathan, 1985). The theory, therefore, suggests that a motivated observer must pay attention to a model’s behavior, must retain what he/she has seen, and must reproduce the behavior. Bandura used his theory in many research studies, including studies with children and social aggression (Bandura, Ross, & Ross, 1963). According to Bandura’s theory, it is inferred that an observer “knows” how to respond before modeling occurs (Whitehurst, 1978). Other psychologists have opposed Bandura’s theory, skeptical of the unobservable cognitive processes assumed, and have presented alternative theories.

#### Vicarious Instigation Theories

From Bandura’s theory, other researchers have attempted to explain how emotion came about through observational learning. Vicarious instigation theories attempt to explain vicarious acquisition of emotion through a classical conditioning paradigm. According to a classical conditioning paradigm, a stimulus (US) elicits a reflex (UR), and when a neutral stimulus (CS) is paired with the first stimulus, the neutral stimulus (CS) eventually will elicit the same response as the first stimulus (CR) (US ----> UR / CS + US ----> UR/ CS ----> CR). Vicarious instigation theories suggest an imitation model of conditioned reflexes and nearness of events in space and time (Whitehurst, 1978). In other words, an observer’s unconditioned response of emotion is dependent on the interference or perception of a model’s unconditioned response (Berger, 1962; Hygge & Dimberg, 1983). The vicarious instigation theories are difficult to measure because emotion and reflexes are difficult to observe. There are many different vicarious instigation



theories, but four major theories have recently come under critical review (Green & Osborne, 1985). Each of these theories attempts to account for vicarious acquisition of emotion in theory and claims to provide support for observational learning theories through research studies. According to Green and Osborne's critical analysis of the literature, they concluded that "no single theory of vicarious instigation is supported unequivocally by the available data" (Green & Osborne, 1985, p. 15). Therefore, there is a possibility that classical conditioning principles play a part in vicarious processes, but it is not currently supported by research findings. Other theories of imitation have been proposed that are somewhat different from vicarious instigation theories and Bandura.

### Miller and Dollard

Miller and Dollard, students of the neobehaviorist Clark Leonard Hull, used Hullian terminology to explain their theory of observational learning. Hull came up with his own behavior system and uses terms such as drive, cue, response, and reward (Hothersal, 1995; Miller & Dollard, 1941). The zeitgeist of the times was Pavlov's conditioned reflex and Thorndike's "law of effect." A learning theorist attempting to explain imitation and all learned behavior, came up with the "two-factor" theory (Mowrer, 1960). Blending Pavlov's and Thorndike's theories, the two-factor theory was presented to explain how classical conditioning and operant conditioning could both be components of the observational learning phenomenon. Through studies with children and animals, and from their history with Hull, Miller and Dollard proposed their theory on observational learning called the "Miller-Dollard theory" (Kymissis & Poulson, 1990). Their basic theory is considered instrumental conditioning and suggests that an observer reinforced for responding in the same way as a model will come to imitate the model. For example, in a study with children, one of two children had been told which of the boxes in the room had candy under it. That child was then allowed to go to the boxes and obtain the candy. The other child stayed and observed. The second child was then given a turn to obtain candy. When the child picked the correct box, he also received candy. It was reported that the observing children did not imitate the model at first, but by the third trial they had learned to imitate even under more difficult conditions (Miller & Dollard, 1941; Staats, 1975). The authors have three subterms for imitation. *Same*

behavior is basically the same topographical behavior between two people. An example is two people who ride the same bus because of a particular cue in their environments such as a bus schedule. (This type of behavior may be with or without the imitative process.) *Matched-dependent behavior* is matched behavior (topographical) and mostly seen in social interactions. This is usually seen with children who try to “match” the behavior of someone wiser and older. This behavior is actually dependent upon the cues of another person, such as the running of an older brother toward the front door to greet his father and the following of a younger sibling. As the boys greet their father, he gives them candy, and this serves as a reward for the “matched” response of the boys. The important part of this analysis is that the actual cues in the environment are different for each boy. The older boy’s cue is the opening of the door, while the younger boy’s cue is the jumping up of his brother’s legs. It is also crucial to point out that the younger boy would not continue to follow the cue or learn if he were not rewarded for doing so. *Copying* is usually learned with an outside critic who rewards or punishes the observer for behavior that is not copied exactly (similarity and dissimilarity; Miller & Dollard, 1941). Therefore, extrinsic rewards are contingent upon similar behaviors, and punishment is contingent upon dissimilar behavior. The cues used in the Miller and Dollard theory have been criticized as simple discrimination training and not really observational learning by operant conditioners (Kymissis & Poulson, 1990; Mowrer, 1960).

#### Operant Conditioning Analysis

Many of the early observational learning studies focused on an analysis of first language acquisition and imitative behavior. Mowrer was one of the early researchers to propose a theory of conditioned reinforcement with imitative behavior, especially first language acquisition (Mowrer, 1950, 1960). Mowrer’s theory has also been known as the “autistic theory” of imitation. He explains his theory through the conditioning of reinforcers. He suggested that through pairing, certain responses acquire positive value or become conditioned reinforcers to the observer. Also, similar responses to the model’s acquire positive value through stimulus generalization (Mowrer, 1960). Sears worked from Mowrer’s ideas and generalized them to other imitative behaviors (Sears, 1957, 1965). Risley also focused on verbal imitative behavior, but argued that Mowrer’s

theory suggested weak reinforcers. He suggests that conditioned reinforcers alone would not sustain behavior over time, but that there was also primary reinforcement provided from care givers for many vocal behaviors (Risley, 1966, 1977).

Fry expanded on Risley's work with a physiological approach to infant verbal imitation. According to Fry's theory, conditioned discrimination occurs with speech sounds and the specific articulatory organs responsible for those sounds. With the development of a mechanism responsible for feedback, there is reproduction of the sounds and learning occurs by imitation. Fry suggests that a child is imitating in the way he/she is trying to produce a sound internally, matching the sounds heard externally (Fry, 1966). He explains that reinforcement and parental presentation of speech stimuli also have a great influence during this babbling period.

Gerwartz and Stingle proposed another possible operant explanation of observational learning through a response class and intermittent reinforcement in children's behavior. Skinner referred to a response class as responses that contain some property in common (Skinner, 1938). Gerwartz and Stingle used this term with regard to a range of behaviors of a parent (model), with which a child (observer) identified (*identification*). Identification was considered to be the development of an imitative repertoire which is generalizable. Gerwartz and Stingle proposed that the child received environmental reinforcement on an intermittent schedule for diverse imitative behaviors, even after long delays and in the absence of the model. They explained these behaviors to be in the same imitative response class, and that delays of performance can be attributed to a "previous history of extrinsic intermittent reinforcement of behavior matching adult performance" (Gerwartz & Stingle, 1968; Whitehurst, 1978, p. 149). From more data-based studies, there is evidence that conditioned reinforcement of similarity plays a role in imitative behavior. In fact, other researchers have extended on Risley's work and established support for generalization, stimulus/response classes, and conditioned reinforcement in imitation (Baer et al., 1967; Kymissis & Poulson, 1994; Risley, 1977).

#### A Radical Behavioristic Analysis

Skinner provided a reductionistic explanation of imitation in many of his writings. He suggested that imitation can be explained through the same three-term contingency of operant

conditioning. Observation of a visual stimulus becomes a learned discriminative stimulus for a response that is followed by a consequence. With verbal behavior, an auditory stimulus might set the occasion for a specific response followed by a reinforcer or punisher (Skinner, 1953). It is then possible that a particular response might come under the control of that particular observed stimulus. Stimulus control then may play a part in observational learning. For example, through discrimination training in a classroom setting, a child might observe another child raise his/her hand, be called on by the teacher, make a verbal response, and receive praise. The observation of this behavior becomes a discriminative stimulus to respond in the same manner, subsequently receiving reinforcement.

One way radical behaviorists explain imitation is through generalized imitation. For example, children with autism or other disabilities, who do not have an imitative behavioral repertoire, do not function very well in society (Baer & Deguchi, 1985). Already having this basic imitative repertoire, a typical child can generalize imitative behavior into other settings. This type of responding (imitation) begins to fall into a functional "response class" in the presence of certain stimuli. It has been shown that it is possible and functional to establish an imitative repertoire with a child through contingent reinforcement, which in turn increases all imitative behavior within the response class. In other words, once children learn to imitate in one situation, there is a high probability that they will imitate in similar situations with similar environmental stimuli because it has been reinforced before. Generalized imitation has three basic components. First, an imitative behavior of an observer must be similar in topography to the model's behavior. Second, the model's behavior must be demonstrated to be directly responsible for the imitative behavior, in other words, "is controlled by virtue of the fine-grained topography of the model's behavior" (Poulson & Kymissis, 1988, p. 325). The third component of generalized imitation is that there is no direct environmental consequence or a reduction for the behavior compared to the conditions during training. "The imitative repertoire must be generative, or rule-governed, rather than dependent on direct reinforcement for each response... 'Do as the model does' in the absence of direct reinforcement" (Poulson & Kymissis, 1988, p. 326). Imitation is a learned behavior from experience, and an observer is reinforced or punished for imitating models who are reinforced or

punished for certain behaviors. Just like other behaviors, in a situation where an observer was reinforced for *imitative* responses, there is a high probability that the observer will *generalize* this type of responding to that similar situation, hence, *generalized imitation*.

### Comparison of Theories

There are some major differences between theories explaining the observational learning phenomenon. For example, social learning theorists attribute causation of behavior to cognitive mediators, possibly ignoring other causal variables. This is especially the case with imitation and delayed performance. If a child does not act immediately after observing a model, social learning theorists attribute this delay in performance to a cognitive mediator. According to the social learning theory, at a cognitive level, specific responses can be easily learned symbolically through observing or perceiving the behavior of a model. Symbolically, a representation of the acquired behavior can be stored and performed later, while using the stored representation as a guide (Bandura, 1971a, 1971b, 1972, 1977; Deguchi, 1984). Through this type of analysis, perception and behavior are completely different. The analysis is focused on the perceived reinforcement of a model rather than on the direct environmental reinforcement. It is not possible to observe and directly measure perception of reinforcement, but it is possible to observe and measure behaviors. Other perspectives, such as a radical behavioristic analysis, do not incorporate cognitive components; instead there is a focus on environmental variables and measurements of observable behaviors. According to Deguchi (1984), the conflicts between the different points of view (radical behaviorists and social learning theorists) appear to lie not within the empirical data, but with the language, and interpretation. Through an operant model or a radical behavioristic analysis, it is not necessary to attribute delayed performance to hypothetical constructs, but to look for an explanation through the learning history of the organism (Deguchi, 1984; Masia & Chase, 1997). This is one of the major differences between these theories.

### Nonhuman Research on Observational Learning

There are many accounts of imitation in nonhumans that provide a further analysis of

observational learning. Many of the first experimentalists failed when studying observational learning with animal subjects. Thorndike (1901) and Watson (1908) both experimented with monkeys and observational learning, and neither obtained results with their procedures. Warden and Jackson (1935) were the first experimentalists to get results using primates. For example, they found that one primate would observe another receive food, then, when given the chance, would imitate the model's behavior in obtaining food. Next, Herbert and Harsh (1944) demonstrated how cats engaged in imitative behavior for their successful experiments in observational learning. Each of these scientists contributed many useful experiments and procedures to the study of observational learning (Chance, 1994). Many of the recent accounts of observational learning have been with foraging and other eating behaviors in animals. For example, one experimenter placed sweet potatoes on a lakeshore where a group of macaque monkeys got together on a regular basis. The sweet potatoes tended to collect sand and one monkey began dipping the potatoes in the water before consuming it. After a short period of time, many other monkeys also began imitating the dipping behavior before consuming their potatoes (Kawamura, 1963).

One of the many areas studied using animals is the delayed responding effect in observational learning. Delayed responding, or "deferred" responding, is responding that occurs after the model is no longer present. Some psychologists attribute delayed responding to a cognitive mediation, but animal studies show this is not necessarily the case. Experimentally naive pigeons have been shown to engage in imitative behaviors, both spontaneously and deferred. In an experiment by Epstein (1996), a naive pigeon pecked at a ping-pong ball, pulled a rope, or pecked a plastic disk at low rates for several sessions after observing a model emit these behaviors. This occurred even in the absence of the model, and was later demonstrated after a 24-hour time interval delay. This behavior was also reported to have occurred despite the naive pigeons never having access to the object in the model's presence (Epstein, 1996). Studies have also been done investigating kitten's food consumption of new foods, not typically consumed, or even aversive substances upon observation of a mother's behavior. Kittens have been observed to eat hot cereals, bananas, potatoes, jellied agar, agar with 0.001% Quinine Hydrochloride, agar with 1%

Sodium Saccharin, and agar with vegetable broth, upon observing their mother doing so (Wyrwicka, 1978, 1981, 1988; Wyrwicka & Long, 1980).

In a naturalistic habitat, there have also been cases of imitation across species. It has been reported that some herbivores such as deer and giraffes will eat fish when they have been raised around fish-eating birds such as flamingoes and pelicans. Other food preference imitative behaviors can also be seen with household pets and humans (Wyrwicka, 1996). Through studies such as these, we can see how important observational learning can be, and the possible survival values in behaving as another organism behaves.

### Applications of Observational Learning with Children

#### Clinical/Applied Settings

Observational learning has also been studied in detail with children's learning processes. Many studies report success using observational learning and operant principles with children in a wide array of applied settings. In clinical settings, there are modeling therapies that incorporate modeling to initiate new behavior and change old behavior (Kirkland & Thelen, 1977; Rosenthal, 1976; Rosenthal & Bandura, 1978; Wilson & O'Leary, 1980). In one study, imitation of nonverbal complex behaviors was established with children with schizophrenia. The experimenters trained an imitative repertoire of 60 tasks using food as a direct reinforcer. After each child completed the imitative behavior of the model in all 60 tasks, these behaviors were then generalized into useful day-to-day tasks, such as personal hygiene, drawing, games, and other skills (Lovaas, Freitas, Nelson, & Whalen, 1967). In another investigation with children with autism, it was reported that certain imitative behaviors will generalize to new tasks in situations similar to the training setting. For example, children learned certain tasks (put doll in crib, hug doll, pile up books, insert one shape in form board, etc.) by observing a model and received reinforcement for doing so. After the completion of these tasks, the children generalized these imitative behaviors to other tasks even when not reinforced (Metz, 1965). Although modeling therapies are used frequently in clinical settings, they may not be used or implemented correctly, because therapists assume that the client understands imitation or has already acquired this skill (Baer & Deguchi,

1985). It has been shown that the more complex the target behavior, the more important teaching imitative behavior is (establishing an imitative repertoire), especially with speech acquisition behaviors (Lovaas et al., 1966).

In another area, observational learning and language acquisition research has focused on children with language disabilities. In an early study, researchers showed that verbal imitation could produce verbal responses over short periods of time. In 20 hours of training, 10 words were reliably imitated by a child with mental retardation. In 10 hours of training, seven vowels and consonant sounds were successfully taught to another child with mental retardation. Other experimenters (Baer et al., 1967) found that the teaching of these basic imitations of verbal behavior and motor tasks also generalized to other settings and situations. In an overview of the language acquisition and intervention literature from 1978 to 1988, Goldstein and Hockenberger (1991) suggested that the key to understanding what is best for children with language impairments was more experimental investigations. They also reported that the same questions still persist: What specific behavior should be taught and what is the best method of teaching children functional communication? It was also suggested that there is a need for researchers to “dig” more deeply to determine why interventions were successful, and seek those underlying principles that will direct future efforts of language intervention (Goldstein & Hockenberger, 1991).

Many data-based investigations have demonstrated that using operant conditioning procedures as interventions allows for a more detailed analysis of observational learning. In a study by Ollendick, Shapiro, and Barrett (1982), they found that rates of puzzle completion initially go up when a child observes another child engaging in this behavior and being reinforced (vicarious reinforcement), but responding decreases over time. It is suggested that this occurs because the observing child never receives direct reinforcement, and therefore it can be considered an extinction procedure (punishment or with holding of a reinforcer). The authors explained that modeling, discrimination cues, and extinction could account for this “short-lived” phenomenon. Especially in a clinical setting with children diagnosed as behavior disordered, it was observed that as the imitative behavior decreased, there was a direct increase in inappropriate behavior.

Another area of interest is the use of observational learning with children diagnosed with



attention-deficit/hyperactivity disorder (ADHD). Barkley (1981) has suggested that observational learning can be used in the behavior management of children with ADHD. Unfortunately, very few data based, well designed, observational learning studies with this population have actually been completed, and/ or discussed in the recent clinical literature (Barkley, 1981, 1989; Paniagua & Black, 1992; Rapport, 1983, 1987). Some of the few researchers who have reported data, reported successful results using correspondence training and observational learning to increase and decrease specific behaviors in a clinic and in the classroom with this population (Paniagua, 1990; Paniagua & Black, 1992). For example, using a do-report correspondence technique (where attention to task demands and absence of inappropriate behavior were reinforced with tangible items; Paniagua, 1990), and observational learning (observing a model), inattention, overactivity, and noise decreased, and academic performance tasks increased. These results were found in a treatment room and in a classroom setting. As this study indicates, it is possible that many of the clinical findings generalize to other settings such as a classroom setting, where more research has been focused.

#### Classroom Behavior and Management with Observational Learning Procedures

The classroom is one of the most functional settings in which observational learning can be used. Observational learning and operant principles in a classroom setting as a teaching strategy have a long history. For example, using demonstration as a technique in teaching is commonplace in education (Baer & Deguchi, 1985). The teacher (or a student) as a model will first show the students how to complete a task, and then the students will model or imitate the observed task. Modeling has been used to teach children with disabilities and disorders, as well as children without. The imitative behaviors of all aged students, preschoolers through university, have been investigated.

In an overview of the vicarious reinforcement and punishment literature in operant programs for children, Kazdin (1979) reported excellent outcome data from many classroom studies. One study targeted disruptive behavior in a first-grade classroom using teacher attention as a reinforcer. Through vicarious reinforcement, observing another child's behavior and

consequences, children's attention and on-task behavior improved (Ward & Baker, 1968). Another study investigated disruptive elementary school children in different classrooms. The study, although focused on one child, increased appropriate classroom behaviors with the target children and nontarget children through vicarious methods (Patterson, 1974). Of the 19 studies reviewed by Kazdin, over half of these targeted attentive behaviors. Most of these studies targeted the behavior of one child, but along with the target child, other children benefited from the observation of the model's behavior and consequences (vicarious reinforcement). According to the data from these studies, vicarious reinforcement can facilitate change in attentive behavior in the classroom, as well as with other behaviors. In his overview, Kazdin concluded that vicarious learning effects may not be as "potent" or as strong as direct contingencies, but may add a great deal to existing interventions (Kazdin, 1979). In another study, while the presence of reinforcement increased responding, the removal of direct reinforcement during vicarious reinforcement decreased certain behavioral responding. The authors suggested that a more detailed analysis with continuous observation might provide further information into vicarious reinforcement (Deguchi, Fujita, & Sato, 1988). Bol and Steinhauer (1990) found that under conditions of no reinforcement and vicarious reinforcement, results were lowest in terms of mean responses. The data demonstrated immediate increases in responding with vicarious reinforcement, followed by a decrease in correct responding for 50% of the children.

Peer tutoring and modeling as teaching methods have earned rank as best practices in educational settings. Such programs have proven successful at increasing social skills, appropriate play skills, and other behaviors, with typically developing students, students with disabilities, and across both populations (Werts, Caldwell, & Wolery, 1996). Most of the research began from the Juniper Gardens Children's Project under Greenwood and his associates (Delquadri, Greenwood, Whorton, Carta, & Hall, 1986; Greenwood, 1991; Greenwood, Delquadri, & Hall, 1989; Greenwood, Terry, Utley, Montagna, & Walker, 1993). Peer tutoring is a practical classroom procedure that also facilitates increases in student responding to academic tasks using observation with peers. The observer is then provided with many opportunities to respond in the same way as the model peer. Increases in attention to instruction and acquisition of mathematical skills, using

peer tutoring for a second-grade student diagnosed with ADHD, has also been demonstrated. This same study demonstrated decreases in irrelevant activity levels as collateral effects of peer tutoring (DuPaul & Henningson, 1993). These procedures have an observational learning component in which a student learns by observing a peer's performance.

There have been a few studies investigating observational learning on the behavior of students diagnosed with emotional and/or behavior disorders. It has been hypothesized that including students with such disorders in a regular education classroom will facilitate appropriate behavior through observing the behavior of other students (Hallenbeck & Kauffman, 1995). Data-based studies on this have produced diverse results, and give suggestions about what observational learning procedures can do to help facilitate this type of learning. For example, Christy (1975) investigated 11 preschool-aged children attending a remedial school for behavior disorders. The experimenters intervened vicariously with teacher attention and food to increase in-seat behavior. With the presentation of teacher attention and food to other students (not target students), the target students could observe their peers' behavior and consequences. They concluded that the effects of vicarious reinforcement initially increased in-seat behavior, but decreased over time (Christy, 1975). This might suggest that vicarious reinforcement functions to temporarily increase behavior, but if the child does not come in contact with the direct contingencies, responding decreases (vicarious extinction). In another study, Birnbrauer, Hopkins, and Kauffman (1982) attempted to increase on-task behavior and following rules with 4 male students (ages 9 to 13) in a residential facility for behavior disorders. Using tokens and vicarious teacher prompting, where nontarget students received tokens, the outcome varied. For some of the students who observed prompting and the consequences of engaging appropriately, on-task behavior and following rules increased, but with others it did not. This suggests that for individual students, under certain contingencies, vicarious procedures will increase on-task and rule-following behavior. Another study demonstrated that the disruptive behavior of a target student and peers decreases, using vicarious feedback (Drabman & Lahey, 1974). In another study, a girl's behavior in a class for students with behavior disorders was targeted. The results demonstrated an increase in the social interactions of the target student as well as in the other students' social interactions

through vicarious reinforcement. The authors concluded that vicarious effects on behavior depend on building a student's imitative behavioral repertoire and history of reinforcement (Strain, Shores, & Kerr, 1976). In an overview of the research with children diagnosed with emotional and behavior disorders, it is concluded that the behavior of these students might initially increase (short-lived) using vicarious methods, but without external reinforcement it will decrease rapidly and not maintain. It is also suggested that the observation of other peers receiving reinforcement for appropriate behavior might imply punishment with this population (Hallenbeck & Kauffman, 1995). According to these studies, it appears that observational learning is useful and functional as a part of integration in a regular education classroom, but educators should not rely solely on observational learning for these students. The research suggests that the application of direct reinforcement procedures must also be implemented to maintain responding over time.

Implied punishment has also been studied with children who are not diagnosed as having behavior or emotional problems. For example, Ollendick and Shapiro (1984) investigated vicarious reinforcement with 216 school children, Grades 1 to 6. They specifically studied the effects of vicarious verbal praise delivered to same-sex partners of subjects on a variation of the coding subtest taken from the WISC-R. It was concluded that the observation of reinforcement tends to operate like a punisher, which decreases responding and increases negative (affective) behaviors. According to another study with similar results, it is possible to counter these effects with direct praise delivered intermittently (Ollendick, Dailey, & Shapiro, 1983). These studies suggest that vicarious punishment functions to decrease certain behaviors, but it is possible to counteract these effects by delivering praise on an intermittent schedule of reinforcement.

Observational learning has been shown to be functional with students diagnosed with mental retardation as well as with peer students in certain procedures. For example, Kazdin (1977) improved attentive behavior with a boy diagnosed with mental retardation and an adjacent peer using teacher attention (Kazdin, 1977). In another study, attentive behavior with two students diagnosed with mental retardation was increased in a special education classroom. The intervention used in this study was verbal and nonverbal approval. The results show that there was an increase in the target child's behavior with direct verbal and nonverbal reinforcement, but there

were also the same effects with the nontarget student (observer; Kazdin, Silverman, & Sittler, 1975).

There may be many variables influencing behavior during the observational learning contingencies (i.e., the model's characteristics, the observer's skill repertoire, and the value of the reinforcing stimulus presented). Many of the studies reviewed hinge on the assumption that a child finds reinforcement value or properties in the stimuli used in the interventions (verbal praise, social reinforcement, attention from an adult or peer, physical contact, food, tokens, etc.) intended to increase appropriate behavior. An analysis or verification of the reinforcing value of a proposed reinforcing stimulus may give professionals an idea of what might be used to increase desired behavior. If the stimulus planned to be used to increase desired behavior does not function as a reinforcer, then it would be appropriate to change the stimulus, or possibly use observational learning as a method to have the desired stimulus acquire temporary reinforcing properties (in turn, increasing desired behavior). Professionals who have limited options of reinforcers may especially find the observational learning method especially useful, because they do not have to change reinforcers. Studies have not investigated or focused on neutral stimuli in a specific setting, and the possibilities of establishing value or reinforcing properties through observational learning to increase rates of responding of a desired behavior.

#### Purpose of the Study

One of the goals of behavior science is to predict and control behavior under specific contingencies. An experimental analysis of observational learning will contribute to the analysis of the probability of a child's response occurring in specific situations. It is possible that through analysis, using measures such as rate of responding, the probability of a specific behavior in settings of imitation might be predicted and/or controlled. Therefore, these highly probable behaviors and procedures might be measured, specified, and used to further facilitate learning.

The primary objective of this study is to determine if it is possible to increase or maintain rates of responding through observational learning with children. The purpose of this study was to

observe and analyze what factors may lead to a child increasing his/her rates of responding after observing another child's behavior and consequences in the same setting.

### Research Questions

Specific research questions to be answered are:

1. When a child observes another child using neutral stimuli (washers), will this increase the observer's rate of responding, consequently establishing reinforcing value or properties to these neutral stimuli?
2. When one child observes another child "discussing" how much he likes the neutral stimulus, will that increase the observer's rate of responding, consequently demonstrating the reinforcing value or properties of these stimuli?
3. When a child observes another child receiving verbal praise from a same-age peer about the neutral stimuli, will this increase the observer's rate of responding, thereby demonstrating the reinforcing value of the stimuli?
4. When a child observes another child receiving verbal praise from an adult about the neutral stimuli, will this increase the observer's rate of responding, consequently showing reinforcing value of the stimuli?
5. When a child observes another child receiving adult praise and also exchanging the reinforcing stimuli for pencils or candy, will this increase the observer's rate of responding?

## METHODOLOGY

### Participants

One female 9-year-old Latino American (Ecuador) fourth-grade student (Female #1), one male 9-year-old African American fourth-grade student (Male #1), one 5-year-old female African American preschool student (Female #2), and one 4-year-old male African American preschool student (Male #2) participated in this study. All students participated on a volunteer basis. Written consent to participate in this study was obtained from parents and students prior to participation. All children in this study were typically developing elementary and preschool students.

### Apparatus

A metal apparatus with two flat push buttons attached to a vertical front panel was used in this study (approximately 1 X 1 inch in width and length). A green button was located on the left and a red button was located on the right, with a washer (token) dispenser located in the middle of the apparatus. The button used for the response task pushed inward approximately one fourth of an inch when pressure was applied. The apparatus was attached to a personal computer using a MED-PC™ Version 2 program. A program was written using MEDSTATE NOTATION™ specifically for this study. The total number of responses, the total time of the session, all latency times, total run time, and intertrial intervals were measured and recorded by this program. The red button was programmed to deliver tokens on a fixed ratio 3 schedule of reinforcement (FR3). In other words, contingent on every third button operation a washer was delivered. A small light behind the red button was illuminated during responses and turned off upon delivery.

### Setting

All students participated in this study at the Fred S. Keller School, a not-for-profit special education preschool located in a large metropolitan area. Sessions were conducted in the corner of a large conference room when no other activities were on-going. The testing room contained a

television, a VCR, a large conference table, chairs, personal computers, and the operant apparatus. All participants had previously visited the testing room before they participated in the study.

### Procedure

Each student completed two baseline phases, A and B, and five video sessions (video presentations #1-5) in which they viewed a video tape of a peer using the apparatus. In baseline phase A, each student was given access to the apparatus for 3 minutes in which no washers were delivered for button presses. A mechanical sound was audible after each button press. Verbal instructions for baseline A were "You can press this button (pointing to the red button) as much as you would like until I ask you to stop."

In baseline phase B, each student was given access to the apparatus for another 3-minute session with washer delivery on an FR3 schedule of reinforcement. A louder mechanical sound was present upon washer delivery. Verbal instructions for baseline B were "When you press this button (pointing to red button), washers will be delivered here (pointing to dispenser)."

In each video presentation, a male model (9-year-old Caucasian) was presented using the same apparatus, responding at a high rate, and receiving a high number of washers over approximately 1 minute in the same setting as each participant in this study. Each video presentation was approximately 3 to 5 minutes in duration. After each video presentation, each participant was given access to the apparatus for 3 minutes.

In video presentation #1, students viewed a video in which the model was presented singing and happily stacking washers in small piles on top of the apparatus. Video presentation #2 presented the model building small piles with his washers, and verbalizing out loud about his washers ("These are great washers, I really like these washers," etc). In video presentation #3, the model was presented building small piles with his washers, and observing a same-aged peer (a 9-year-old Caucasian male) enter the room. The peer began giving verbal statements about the washers (e.g., "Those are excellent washers! Those are so cool! I wish I could have some like those!"). The verbal statements were about the washers and not about button pushing. Video presentation #4 presented the model stacking washers in a small pile, and observing an adult



Korean male enter the room. The adult male began giving verbal statements about the washers (e.g., “Those are great washers! They look like a silver dollar, look how shiny they are, they glow!”). Video presentation #5 consisted of the male model stacking washers in a small pile, and observing an adult male enter the room. The adult male entered the room carrying a tray of cookies and candy and stated, “You may exchange washers for food.” The male student is then observed exchanging approximately five washers for one item of food at a time. The student is observed exchanging for a short period of time, verbalizing “Thank you,” and then the adult is observed leaving the room.

Video presentations were presented in varying order for each student, to control for sequencing effects (see Table 1). Two additional students participated as pilot subjects in order to determine appropriate session lengths and appropriate mechanical manipulations (washer delivery), but data were not reported due to incomplete sessions and mechanical difficulties.

Table 1

Order of Video Presentations

Participants	Video Presentations
Female #1	baseline A, baseline B, VP 2 - VP 1 - VP 4 - VP 3 - VP 5
Male #1	baseline A, baseline B, VP 3 - VP 1 - VP 5 - VP 2 - VP 4
Female #2	baseline A, baseline B, VP 1 - VP 2 - VP 3 - VP 4 - VP 5
Male #2	baseline A, baseline B, VP 5 - VP 4 - VP 1 - VP 3 - VP 2

Note. VP = video presentation.

## RESULTS

The rate of responding following each video, the dependent measure in this study, varied across video presentations for each student. To determine rate, the total number of button presses on the response key and the total run time in seconds were measured. The session run time in seconds was converted to minutes. The total number of button presses was then divided into the total run time in minutes. Initially, each student demonstrated that washer delivery was a neutral or punishing event, as displayed by a decrease in response rate from baseline A with no washer delivery, to washer delivery during baseline B. Following baseline B, individual responses varied as is discussed below.

Figure 1 displays the data for Female #1, the 9-year-old Latino female student. Baseline A rate of button pressing with no washer delivery was at 140 responses per minute. Baseline B, in which washers were delivered, responding decreased to 108 button presses per minute. After video presentation #2 was shown, rates of responding increased to 125, which was approximately the response rate during baseline A. After video presentation #1 was shown the rate of responding increased to 146. After video presentation #4, Female #1 responded with 163 button presses per minute, the highest rate of all her sessions. Following video presentation #3, Female #1 slightly decreased to 149 responses per minute. The final video segment was shown (video presentation #5) and Female #1 responded at a rate of 140 button presses per minute, which was a slight decrease from the previous condition. Overall, Female #1's rates increased over sessions but, peaked at treatment condition #4 (verbal statements from an adult), and then decreased following the last two video presentations.

Figure 2 displays the data for Male #1, a 9-year-old African American male student. During baseline A, his rate of responding was at 112 per minute. Upon washer delivery, baseline B, responding decreased slightly to 105 per minute. Video presentation #3 was presented and Male #1 responded at 154 per minute, which was a noticeable increase over both baseline conditions. After video presentation #1, the rate of responding increased to 160. After video presentation #5, rate of responding increased to a rate of 175 per minute. From this point, after exposure to video presentations #2 and #4, button pressing decreased gradually to 166 and 142, respectively. It is

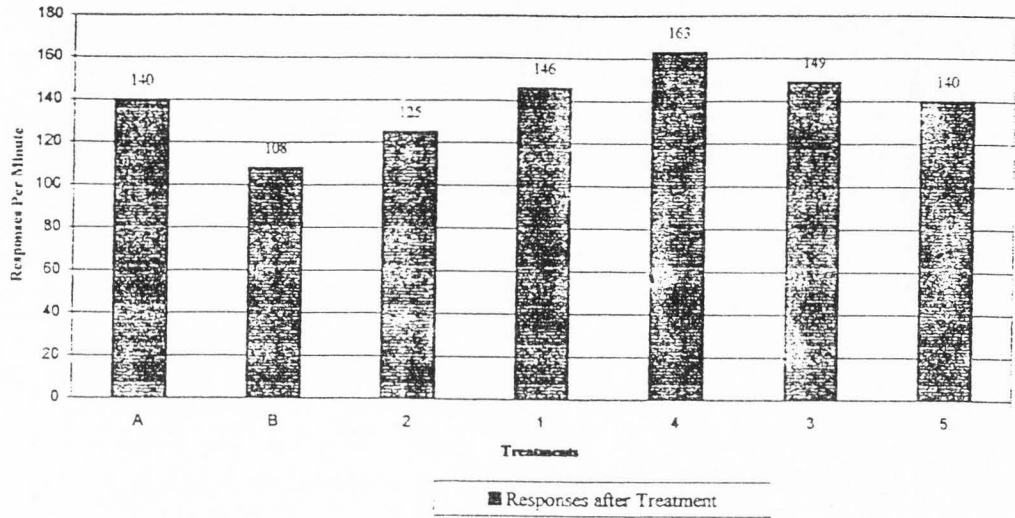


Figure 1. Female #1.

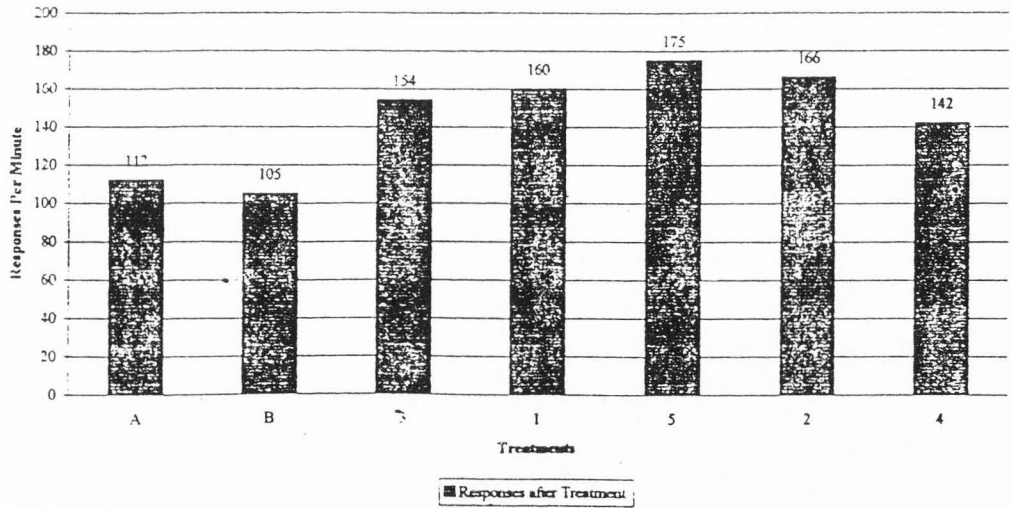


Figure 2. Male #1.

noted that all rates of responding after observing the video presentations were over baseline rates. Because the rate of button pressing increased in all conditions, it can be stated that washers acquired reinforcement value for Male #1. This is particularly evident following video presentation #5 (male student exchanging washers for primary reinforcers) where his rate of response is highest.

Figure 3 displays the data for Female #2, a 5-year-old African American female student. Baseline A rate of responding was recorded at 115 per minute. Baseline B responses were measured at 101, which is a decrease in rate compared to baseline A. Video presentation #1 was presented and Female #2's responses increased to 127 button presses per minute. Video presentation #2 was presented and button pressing increased to 141 responses per minute. After video presentation #3, rates of response decreased slightly to 139. A rate of 146 button presses per minute was observed after Female #2 watched video presentation #4. The overall highest rates were measured after video presentation #5, which rose to 153 presses per minute. Rates of button pressing during treatment conditions were all noticeably higher than during baseline conditions A and B. When treatment conditions are compared to baseline A and B, it is demonstrated that there were no preferences for washers upon delivery during baseline B, because of a decrease in rate from A to B. The increase in responding across all treatment conditions suggests that washers did acquire reinforcing properties or value through observation of the video conditions.

Figure 4 shows the data for Male #2, a 4-year-old African American male student. Baseline A rates for Male #2 were noticeably higher than baseline B, from 48 to 4, respectively. Male #2 was shown video presentation #5 first, and rates of button pressing were measured equal to baseline B, but lower than baseline A. After video presentation #4, responding increased slightly to 5, then, decreased to 4 after video presentation #1. A slight increase in button pressing after video presentation #3 was observed to 6, but the largest increase was measured after #2 at 16 button presses per minute. Responding after video presentation #2 was the highest across conditions. Video presentation #3 was also slightly higher than baseline B.

Anecdotally, Male #2 was often observed pressing the button twice and pausing for long intervals before pressing the button a third time. Upon pressing the button a third time, Male #2 was observed physically jumping (as if startled) upon washer delivery. A fear of the sound of the

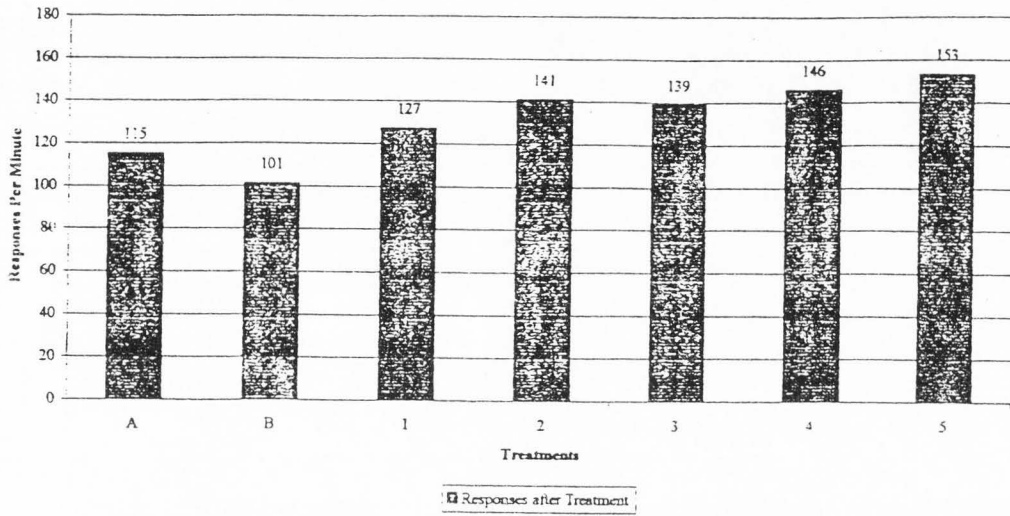


Figure 3. Female #2 (Preschool).

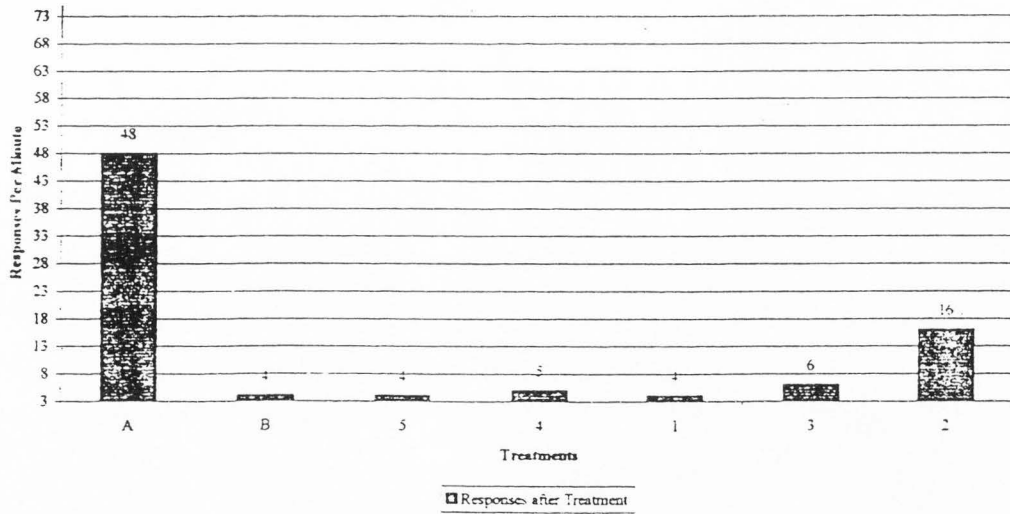


Figure 4. Male #2 (Preschool).

washer dispenser may have been a confounding variable in this data, significantly slowing rates of button pressing.

Across all subjects (except Male #2), rates of responding increased over baseline B, after each video presentation. The magnitudes of increases in rates of response from baseline B to the highest rate for each student was as follows: Female #1: from 108 to 163 = 55 increase, Male #1: 105 to 175 = 70 increase, Female #2: 101 to 153 = 52 increase, Male #2: 4 to 16 = 12 increase.

The data show that observing a male student receiving praise from an adult increased the rate of responding the most for Female #1. For both Male #1 and Female #2, rates of responding were highest after observing a same age peer exchanging washers for primary reinforcers. There were variable ascending and descending trends across all five alternating treatment sessions for all subjects (see Figure 5).

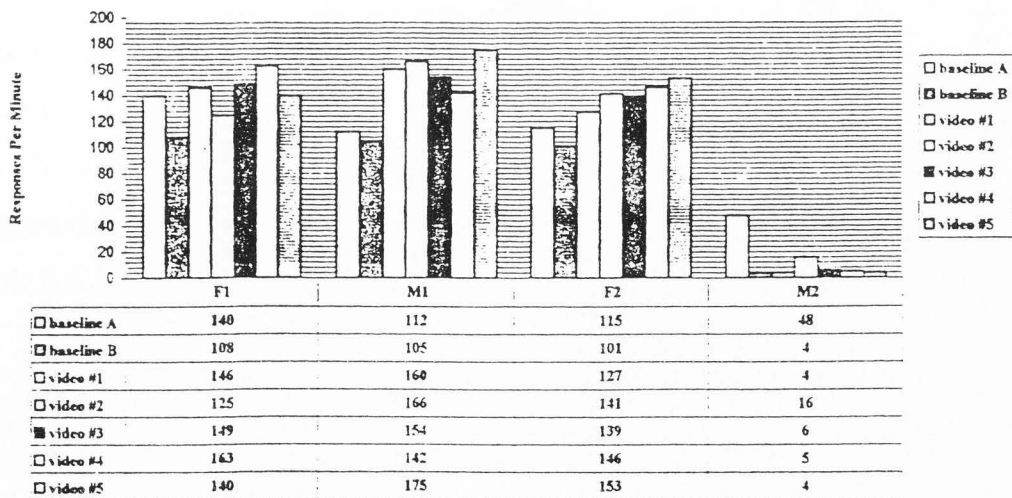


Figure 5. Video presentations across all students.

## DISCUSSION

### Purpose and Results

In the current study, the purpose was to observe baseline rates of button presses and analyze factors leading to changes in responding, after observing another child's behavior and consequences in the same setting. The decreases from baselines A to B, across all students, demonstrated that the delivery of washers reduced rates of responding. Otherwise, it would have been expected that all students would have responded at higher rates during baseline B as compared to baseline A. Novelty as a variable (potentially influencing results from baseline to treatment phases) was controlled by having these two baseline phases. We can conclude from these data that the delivery of washers were neutral or even punishing as observed with an immediate decrease in responding across baselines. Rates of response increased from baseline B for all students (except for Male #2), after watching a male student "enjoy" the washers, receiving praise about his washers, or exchanging them for primary reinforcers, but there was no one video scenario that consistently produced the highest rate of responding among participants. One possible explanation for this could be attributed to each student's individual history of reinforcement. Two of the four subjects increased responding the most after video presentation #5, suggesting that viewing an exchange of washers for primary reinforcers was most reinforcing. Because there was a shift in rates of responding at the treatment introduction points, it can be concluded that the shifts are a product of the independent variable (watching a model). These data suggest that neutral stimuli acquired reinforcing properties or value through observational learning with these students of different ages.

In the literature about observational learning it is assumed that when an observer sees a model behaving in a certain manner, there is a process of learning occurring. From these data and those from vicarious reinforcement studies, it might be inferred that observational learning be considered a process, but the presentation of a model engaging in specific behavior might best be considered an establishing operation. The presentation of the model engaging in button pushing, receiving washers at a high rate with and without consequences, temporarily changed the value of

the washers, from being previously neutral to more reinforcing (increasing rate). An establishing operation temporarily changes the value of a stimulus as a reinforcer; therefore, by definition it will increase responding compared to baseline rates. Keller and Schoenfeld (1950) and Michael (1982) have described this process. An establishing operation “is an environmental event, operation, or stimulus condition that affects an organism by momentarily altering (a) the reinforcing effectiveness of other events, and (b) the frequency of occurrence of the type of behavior that had been consequted by those other events” (Michael, 1993, p. 58). These data demonstrate that a neutral stimulus can acquire reinforcing properties or value for an observer after observing a model’s behavior with and without consequences; thus the presentation of a model for an observer might be considered an establishing operation to increase or decrease responding of some type. This is similar to the vicarious reinforcement literature, but differs in the way a stimulus can become reinforcing after the stimulus has been established as neutral. The vicarious reinforcement literature suggests that there is a higher probability for an observer to engage in the behavior of the model if the consequences are positive. In this study, the consequences were established as neutral, but then changed variably after the observers viewed specific video presentations (different consequences in each video presentation).

#### Limitations and Implications

Limitations to this study might include the presentation method of the video segments. An analysis with fewer and less detailed video segments might provide more information with regard to specific features of observational learning and stimuli. For example, it might have been better to have made two or three less detailed videos and provided longer sessions for responding. Future investigations might consider presenting videos with exchange for primary reinforcers, praise from a same-age peer, and adult praise or interaction. These conditions would contain major features that could be noticeable and obvious to most age groups. Video presentations #1 and #2 may have contained features that were too detailed for some viewers. The only difference between these videos was the model’s singing in video presentation #1 and verbalizing out loud about his washers



in video presentation #2. This might especially be the case for developmentally delayed, younger, overactive, and inattentive students who view these video presentations.

It is also possible that a ceiling effect could have occurred, given that subjects (except Male #2) responded at a very high rate. It may be that subjects could not have responded any more quickly, thus limiting possible variability.

It would also be informative to use a mildly developmentally delayed population of students where most of their observational repertoires are measured and followed over time. This population might provide more information with regard to social and other prerequisite repertoires necessary for observational learning as an establishing operation to occur.

The literature also suggests that the most effective model needs to be of the same gender, race, and age, and have certain desirable characteristics to have an optimal effect on the observer. With such a diverse population of subjects, this was difficult to accomplish with race and gender. It was not possible to make individual video segments for each student; therefore, a Caucasian child model and Korean American adult model were used for the video segments. In future studies, gender and race of the models might be investigated and varied in order to observe differences between responding, after viewing models better matched with an observer's characteristics. It might also be beneficial to implement a true reversal (include a condition where washers were not available for button pressing) in order to conclude that observational learning, the presentation of a model and their consequences, functions as an establishing operation.

Future investigations might include using a choice assessment (i.e., Fisher et al., 1992), measuring duration of toy or item (token) manipulation, rank ordering the items, and presenting videos or a model in vivo engaging with a less preferred item. It would then be possible to again measure duration of toy or item manipulation and rank order items to see changes in reinforcer preferences.

### Conclusion

The present study answered the question whether a neutral stimulus can acquire reinforcing properties through observational learning procedures. These results add information to

the existing literature on observational learning, specifically on antecedent and consequent effects on children's behavior. It is common for teachers and other professionals to assume that verbal praise, peer or teacher attention, and tangible items are reinforcers that will increase a desired behavior. On most occasions this may be a correct assumption, but on others may not be the case. Observational procedures (i.e., establishing operations) might especially apply when introducing a novel stimulus as a reinforcer in a token economy system in the classroom, or attempting to increase on-task behavior with noncompliant students. When a potential reinforcer is not functioning as a reinforcer and materials are limited, it seems possible to use observational learning as an establishing operation in order to temporarily change the value of that particular neutral stimulus, in turn increasing appropriate behavior. Many students have a broad repertoire of observational learning skills and are attentive to other students' responses in the classroom. For example, if a student refuses to complete a task for a specific reinforcer because it is neutral (i.e., "Finish your math worksheet, then you can play with the blocks"), then the observation of a model engaging in the appropriate behavior and being allowed to engage with the stimulus (play with the blocks) may serve as an antecedent event to temporarily give the previously neutral stimulus reinforcing properties (i.e., the blocks were previously neutral, but are now reinforcing because he/she observes the other child enjoying them). These techniques may be used in schools and clinics to increase the number of preferred activities and tangible items that may be used as reinforcers. These results also help take this process and break it down into behavioral components for further investigation rather than inferred cognitive processes. Observational learning is a skill repertoire affected by the environment, which can be directly observed and measured. It is possible to manipulate antecedent events and see their effects; therefore, it is not necessary to rely on indirect measures and manipulations related to traditional observational learning procedures.

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