THE EFFECTS OF OBSERVER AGE AND TYPE OF TASK ON THE IMITATION OF ADULT AND PEER MODELS

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To the primary sources of this work--my wife, Julie, and my nephew, Kendall

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INTRODUCTION

Imitation has been a concept in psychology dating back at least to the turn of the century, when it was discussed by men such as Morgan and McDougall. However, at that time, due to its association with instinct, the concept was framed in terms not susceptible to empirical verification. As a result, the concept of imitation remained suspect and unscientific, but it experienced revivals of interest under the guise of different terminology. The operant-reinforcement view of imitation has been one of the more recent paradigms under which imitation has been considered, especially in relation to early development and the learning of language (Miller and Dollard, 1941; Bijou and Baer, 1965; Skinner, 1953;1957). This point of view has led to important research (Baer and Sherman, 1964) and clinical applications (Metz, 1965; Risley, 1966), especially with children.

However, the work of Bandura (1962;1965a;1965c), which will be the basis of this investigation, represents another current, exciting renewal of interest in the area of imitation under the labels of vicarious learning and modeling. As Bandura (1965a) points out, a primary source of new behavior or new combinations of previously learned behaviors for humans is the behavior of other humans. It is obvious that many complex and important human behaviors are learned through one person observing the behavior of another person, the model. It is also obvious that such

modeling procedures are a very efficient and, at times, indispensible way of passing along behavior, even whole repertories of behavior. Modeling procedures run the gamut of age ranges and become more explicit as age increases, expecially as verbal behavior increases. A combination of verbal (symbolic) and demonstrative (live) aspects in modeling procedures is assumed to be optimally effective. While all this is certainly no new revelation, Bandura correctly stresses that such an emphasis is in contrast to the emphasis that current learning theories place on operant conditioning, learning by successive approximations, and reinforcement:

> Research and theoretical interpretations of learning processes have focussed almost exclusively on a single mode of response acquisition which is exemplified by the operant or instrumental conditioning paradigm. In this procedure the organism is impelled, in one way or another, to perform responses under specific stimulus conditions and, through differential reinforcement of spontaneously emitted variations in behavior, new patterns are developed or existing repertories are brought under new discriminative stimulus control. It is generally assumed that the principles governing the latter mode of response acquisition account also for social-learning phenomena occurring under naturalistic conditions.
> The continued adherence to a relatively narrow range of learning principles and procedures stems primarily from the fact that certain critical conditions that obtain in real-life situations are rarely, if ever, reproduced in laboratory studies of learning. Thus, in laboratory investigations experimenters arrange comparatively benign environments in which errors will not produce fatal consequences for the organism. By contrast, naturalistic environs are loaded with potentially lethal consequences that unmercifully befall those who happen to perform hazardous errors. For this reason, it would be exceedingly injudicious to rely primarily upon trial-and-error and successive approximations methods in teaching children to swim, adolescents to drive automobiles, or adults to master complex occupational and social tasks. If rodents and pigeons toiling in Skinner boxes and various mazes could likewise get electrocuted, dismembered, or extensively bruised for errors that inevitably occur during early phases of learning, it is a reasonably safe prediction that few of these venturesome subjects would ever survive the shaping process. Apart from questions of efficiency...and survival, it is doubtful if many classes of responses would ever be acquired if social training proceeded solely by the method of approximations through

differential reinforcement of emitted responses..."(Bandura, 1965c, p. 1).

It is also clear that while operant methods are very efficient for strengthening and maintaining behavior already possessed by individuals, such methods are very often inefficient for developing new behavior (Bandura, 1965a). The point is that work on imitative learning and modeling is generating meaningful, much needed investigations into the conditions of human learning in social situations. Social situations represent the settings for a large percentage of human learning, and there is much yet to be learned about the effects of such settings. The study of modeling and social interaction effects also represents meaningful work on human learning, especially developmental human learning, which is more relevant to real life situations than is frequently the case in other approaches to learning (Epstein, 1962).

Vicarious Learning and Identification

Given the importance of the area of study, the question becomes one of how learning takes place through modeling--the question of vicarious learning. Bandura (1965c) has summarized various viewpoints on vicarious learning and distinguished his position from the others (Bandura and Walters, 1963). He notes that instead of imitation there are now many terms used to refer to essentially the same phenomena-- "observational learning," "copying," "social facilitation," "vicarious learning," "contagion," "identification," and "role playing" (Bandura, 1965c, p. 2). Because Bandura thinks that the same basic process of learning is involved regardless of the models, stimulus conditions, content, and generality of

what is learned, he does not concern himself with the above variety of terms. He uses the terms imitative, observational, and vicarious learning interchangeably to refer to the differences in behavior resulting from modeling stimuli.

His definition and views of vicarious learning are as follows:

> ...a vicarious learning event is defined as one in which new responses are acquired or the characteristics of existing response repertories are modified as a function of observing the behavior of others and its reinforcing consequences, without the modeled responses being overtly performed by the viewer during the exposure period. In demonstrating vicarious learning phenomena, it is therefore necessary to employ a nonresponse acquisition procedure in which a subject simply observes a model's behavior, but otherwise performs no overt instrumental responses, nor is administered any reinforcing stimuli during the period of acquisition. Any learning that occurs under these limiting conditions is purely on an observational or covert basis. This mode of response acquisition is accordingly designated as no-trial learning, since the observer does not engage in any *overt responding trials* although... he may require multiple *observational trials* in order to reproduce the modeled stimuli accurately. Moreover, the development of mediational responses, in the form of imaginal and implicit verbal representations of the perceived stimulus events, may play a critical role in the vicarious learning process (Bandura, 1965c, p. 2).

> Unlike most previous accounts of modeling effects, which tend to highlight the reinforcing stimulus control of matching responses, the theory propounded by the author emphasizes the function of representational processes in observational learning. According to this formulation, matching responses are acquired on the basis of stimulus contiguity and are mediated by cue-producing symbolic responses which exercise discriminative stimulus control over corresponding overt performances. Thus, in this mode of response acquisition, imaginal and verbal representations of modeling stimuli constitute the enduring products of observational experiences. While the perceptual and cognitive aspects of vicarious learning are given emphasis, it is recognized that motivational and reinforcement variables may influence indirectly the level of *response acquisition* by augmenting or reducing the occurrence of requisite observing responses and facilitative covert rehearsal. There is

> considerable research evidence, however, that the *performance* of previously learned matching responses is primarily governed by reinforcement-related variables... The theory advanced ... suggests that vicarious learning may be analyzed in the same manner as other associative learning processes ... The fact that vicarious learning experiments employ social cues rather than nonsense syllables does not result in an acquisition process that is fundamentally different from traditional associative learning (Bandura, 1965c, pp. 41-42).

Bandura goes on to contrast his "contiguous sensory stimulation" position with three other categories of learning positions and indicates his position better accounts for the phenomena of vicarious learning. According to Bandura (1965c, pp. 3-8),"associative and classical conditioning theories" (Humphrey, Allport, Holt, Piaget) do not account for novel responses in the observer resulting from the model-observer interaction; "instrumental conditioning theories" (Miller and Dollard, Skinner) do not account for novel responses being acquired through observation prior to performance and reinforcement and often confuse acquisition and performance; "sensory feedback theory" (Mowrer) involving classical conditioning cannot adequately account with peripheral feedback and proprioceptive cues for imitative responses without reinforcement of either model or observer. Because the focus of the present work will be primarily on aspects of performance rather than learning,these theoretical differences need not be pursued further here.

Concerning the allied concept of identification, as compared with imitation, the following stand is taken (Bandura, 1962, p. 215):

> This type of learning is generally labeled "imitation" in behavior theory, and "identification" in most theories of personality. These concepts,however, are treated ... as synonymous since both encompass the same behavioral phenomenon, i.e., the tendency for a person to match the behavior or attitudes as exhibited by actual or symbolized models.

This appears to be the most fruitful position to take and coincides with the "identification as behavior" viewpoint, one of the three main viewpoints on the nature of identification found in a review of the literature by Bronfenbrenner (1960). The "identification as behavior" position appeared to be the most useful of the three positions in the opinion of Bronfenbrenner. As he pointed out, the other two main views of identification--"identification as a motive," and "identification as process"--are less empirical in nature and do not lend themselves to empirical study. While some investigators do not favor the "identification as behavior" position (Kagan, 1958), the point is that even identification itself, as a concept, especially as a concept connoting unconscious processes, seems to hinder definitive work in the area it is concerned with delineating:

> Identification, as nominally defined, tends to preclude adequate and valid operational definition and empirical test. Identification is a hypothetical construct, which seems destined to remain a hypothetical construct. As such, it can explain nothing. Nor does it seem to lead to a definition of those variables and the process by which they interact which would constitute an explanation, subject to experimental verification (Martin, 1954, p. 214).

Review of Studies

The behavioral effects of exposure to modeling stimuli fall into three main categories (Bandura, 1965a, pp. 320-321):

> (1) ... the observer may acquire new responses that did not exist in his behavioral repertoire. In demonstrating this *modeling effect* experimentally, the model exhibits responses that the observer has not yet learned to make, and he must reproduce them in substantially identical form...

> (2) Exposure to models may also strengthen or weaken inhibitory responses in the observer. These *inhibitory* and *disinhibitory* effects are evident when the frequency of imitative and non-matching responses increases or decreases, often as a function of rewarding or punishing response consequences to the model...
>
> (3) ... the behavior of models may elicit previously learned responses that match precisely or bear some resemblance to those exhibited by the model. This *response facilitation effect* can be distinguished from disinhibition when the behavior in question is not likely to have incurred punishment and, therefore, any increase in responsivity is not attributable to the reduction of inhibitory responses.

In more specific terms, some of the experimental results are as follows. In order to assess the effectiveness of modeling and operant conditioning, Bandura and McDonald (1963) attempted to change the moral orientations (Piaget's objective and subjective moral orientations) of 5 to 11 year old children by the following three methods: (1) having children observe adult models express moral judgements counter to the group's orientation and be reinforced with approval, reinforcing the children with approval for adopting the model's responses; (2) having another group observe the models reinforced but not reinforcing the children's matching behavior; (3) having a third group receive no exposure to models but reinforcing the judgements of the children which were counter to children's judgement tendencies. The children in the modeling groups were not significantly different from each other but showed significantly higher modifications in their moral judgements in the direction of the attempted influence than the children in the group using only reinforcement, who did not change significantly. Also, the groups maintained their altered positions in a new situation in which the models and social reinforcement were absent, suggesting modeling effects can be long-lasting.

Perhaps the classic studies were the ones in which the social transmission of novel aggressive responses and film versus live models were investigated (Bandura, Ross, and Ross, 1961; Bandura, Ross, and Ross, 1963b). In the 1961 experiment, children from a nursery school, with an average age of 52 months, were assigned to three conditions: (1) observation of aggressive adult model; (2) observation of inhibited nonaggressive model; (3) no exposure to a model. The experimental groups observed an adult model interact physically and verbally with a large plastic doll and then were frustrated and tested for imitative and nonimitative aggressive behavior. Approximately the same paradigm was used in the 1963 experiment with same age subjects from the same school. Three groups were used: (1) observation of real-life aggressive model; (2) observation of the same aggressive model on film; (3) observation of a model on film in the costume of a cartoon cat showing the same aggressive behavior. Children who observed the aggressive models showed roughly twice as much aggressive behavior as the children in the nonaggressive and control groups. The nonaggressive group showed significantly less aggressive behavior than the controls. Children who observed the aggressive models showed many precisely matching physical and verbal aggressive acts. This behavior occurred only rarely in the other groups. The film-mediated aggressive models and the cartoon character were as effective as the real-life models in promoting aggressive behavior, although the modeling effects were not as prominent in the cartoon character group.

In order to investigate whether reinforcement functions more as a performance or more as a learning variable, Bandura (1965b) had nursery school subjects observe an aggressive film-mediated model rewarded, punished,

or receive no consequences for his aggressive acts. The results indicated that children in the model-punished group gave significantly fewer matching responses than children in the other two groups. However, when the children in each group were offered rewards if they could reproduce the model's aggressive behavior, the previous differences among the three groups disappeared, indicating an equal amount of learning in each group. The results supported Bandura's contiguity theory--reinforcement of the model influenced the observers' performances but not their acquisition of matching responses or learning.

The influence of adult and peer models has also been studied, in relation to aggressive behavior and patterns of self-reinforcement. Bandura and Kupers (1964) had 7 to 9 year old children in one group observe either peer or adult models who adopted a high criterion for self-reinforcement on a bowling game, while those in another group observed models employing a low criterion for self-reinforcement. It was found that the subjects' patterns of self-reinforcement were closely related to the models they had observed, with the adult models having a more powerful influence than the peer models. The influence of peer models and adult models has been studied in another situation in an interesting investigation by Hicks (1965). Hicks looked into the effects of adult and peer film-mediated aggressive models on imitation and retention of modeled responses. Children from 3 to 6 years of age viewed either male or female adult or peer aggressive models and then were tested for imitative behavior two times. The first time was immediately after the observation of the models and a mild frustration. The second time was 6 months later, following the same mild frustration but without any re-

observation of the models. It was found that the peer male model group showed the greatest immediate modeling influence. After 6 months, however, the adult male model group showed the most matching behavior, although none of the groups performed even close to the amount of imitative behavior that they had displayed immediately after exposure to the models. Tests of retention after 6 months also revealed a significantly greater number of matching responses had been retained than had been performed.

In another investigation of modeling and self-reinforcement, Mischel and Liebert (1966) found that fourth grade children tended to impose on younger children, second grade children of the same sex as the subjects, the identical self-reward criteria they imposed on themselves when playing a game. The subjects previously played the game with an adult model who imposed a level of self-reward on the subject which was equal to, higher than, or lower than the level employed by the model. As predicted, in the absence of the model the subjects on whom high criteria were imposed and who also observed their model employ equally high criteria were the most stringent in applying self-rewards to themselves and younger children. The subjects who had observed high modeled criteria but had been permitted self-reward for lower performances were the least stringent. When imposed and observed criteria were discrepant the least stringent criteria tended to be employed by the subject. There were no differences between the self-reward criteria employed by the subject for himself and the criteria imposed by the subject on younger children if the subject demonstrated the task to the younger child immediately following his performance of the task alone. However, if immediately after the modeling situation the subject demonstrated

the task to the younger child before performing it alone, there were some differences between the self-reward used by the subject and imposed on the younger child.

Studies by Mussen and Parker (1965) on 5 year old girls and by Bandura and Huston (1961) on 3 to 5 year old children indicate that nurturance or positive social interaction displayed by the model to the subject leads to more imitation of task irrelevant (non-problem-solving) behavior than to more imitation of task relevant behavior. However, the opposite of this was found by Henker (1963) with 6 to 10 year old boys in a study of the effects of rewarding, critical, and neutral models in various situations. The play behavior of the subjects showed no difference in amount of imitation, but task relevant behavior on a problem-solving task was related to the type of model observed and his previously displayed (experimentally manipulated) competence. In this regard, Aronfreed (1964) noted an absence of any consistent direct relationship between amount of parental nurturance and extent of internalization.

There have been numerous other studies by Bandura and by other investigators related to the realm of modeling but not especially relevant or more elucidating to the purposes of the present study. Surprisingly, however, there is a great paucity of developmental studies in the area of modeling, as in many other areas. Most of the older studies in the area dealt exclusively with a very narrow age group, usually preschool children, and used criteria and situations such as verbal responses to questions concerning imitation, simple manipulation of dolls, or verbal reports of what they would do in hypothetical situations, rather than actual behavioral

samples in a "real-life" situation. Some examples are as follows. Hartup (1964), in doll play situations with 3 to 5 year old children, found that there was a moderate generalization across situations of same-sex imitation but not of opposite-sex imitation. When nonimitation could occur as a response choice it occurred more frequently than imitation. This nonimitation tendency had been previously pointed out by McDavid (1959) in 3 to 5 year old children where imitative behavior seemed to be related to child-rearing practices and sibling constellation but not to intelligence or dependency. Brown (1956), studying sex-role preferences in 5 and 6 year olds, found boys to have a stronger preference for the masculine role than girls for the feminine role, no differences between upper and lower middle class groups, and that boys having only sisters or both brothers and sisters scored more feminine than boys having only brothers. Brown used a sex-role preference scale called the It Scale for Children (ITSC). Hartup and Zook (1960), also using the ITSC, studied the sex-role preferences of 3 and 4 year old children and found the 4 year old boys scored more masculine than the 3 year old boys, and the 4 year old girls scored more feminine than the 3 year old girls. Lynn (1959) reviewed research on the development of identification and suggested that with increasing age males become more firmly identified with the masculine role, responding more to a cultural stereotype of the masculine role. With increasing age females become less firmly identified with the feminine role, responding more to aspects of their own mother's role. Gelfand (1962) got results in work with fifth grade children which indicated that failure on tasks in comparison to a peer's success on the tasks led to matching of the peer's responses on a

picture preference task. Task performances inconsistent with the child's self-evaluations led to more verbal conditioning in such children than in children whose task performances were consistent with their self-attitudes (performances experimentally manipulated). DeRath (1963) found prohibitive verbal instructions paired with a film-mediated aggressive model to be effective in inhibiting the performance of aggressive behavior in nursery school boys. The inhibition group performed less aggressive responses than a group which saw the same film but received no prohibitive instructions.

Implications for Future Study

A number of conclusions and suggested areas for further study emerge from these investigations of imitative behavior. It has been conclusively shown that modeling procedures can lead to changed behavior in the observer and that live and filmed models can be equally effective. The primary relevant variables seem to be the age of the model, the age of the observer, the sex of the model and the observer, the type of task or the type of behavior involved, and the performance situation.

The first and most obvious characteristic of the modeling studies is that most of them have been done with preschool children or with very limited age ranges. This characteristic has resulted in the inability to generalize across age levels on significant variables such as the effects of model age, type of task, or type of performance situation. Second, the range of modeling tasks or behaviors has been very narrow,also. Aggressive behavior has been the primary focus in most of the recent studies. Third, the modeling paradigm has been oversimplified by having the subject observe only one model. Outside the laboratory a person faced with a task is or

has usually been exposed to more than one model and more than one method of doing the task, resulting in the necessity for dealing with the various methods observed. He may combine aspects of different methods, employ a few or no aspects of any method observed, or follow precisely one of the observed methods. Such a situation is often made more complex by adult models being in opposition to peer models and the changes in influence of each according to the age of the observer. Fourth, the situation in which the observer performs, following exposure to modeling stimuli, probably affects what he will perform as opposed to what he learned. For example, whether the observer performs in the presence of an adult, a peer, an older person, a younger person, alone, or in a group is a factor relevant to what is performed.

These four variables have either not been studied at all or have only been touched on in modeling experiments. This investigation attempts to study the first three of these variables--age of observer, type of task or behavior, number and age of models.

Present Investigation

This investigation was an attempt to analyze the effects of observer age and type of task on the imitation of adult and peer models. The term imitation, as it is used herein, means "response facilitation effect," as defined by Bandura. Thus, the emphasis is on performance rather than learning.

Three different observer age levels and five types of tasks were used. The situation studied was one in which a subject performed five tasks following the observation of an adult and a peer performing the tasks

in contrasting ways.

The three different observer age levels were first, fifth, and seventh graders. These three grade levels, equivalent to ages 6, 10, and 12, were hypothesized as different on a chronological basis and on the basis of developmental theory. The three age-grade levels can be viewed as approximating developmental phases III, IV, and V in the scheme resulting from Maier's (1965) integration of the developmental sequences of Erikson, Piaget, and Sears. Apart from intra-personal characteristics of these children in these three developmental phases there are inter-personal interactions which seem to be different. At age 6 the child is still making his entrance into the world of structured inter-personal relationships with those his own age and with adults outside of his family. In these early stages of schooling, adults, primarily in the form of teachers, determine many things he does and require specific methods for doing various tasks. Thus, the child is dependent on adult models at this stage for new types of behavior and knowledge and must change other types of previously learned behavior to conform to the school routine. In other words, the adult is a very potent model for the 6 year old child. This potency of the adult model, however, apparently declines with age but does not seem to decline in a linear fashion. As the child grows older the adult model may remain very potent for certain types of behavior in certain types of situations but may have very little influence, compared with a peer model, over other types of behavior in other situations. This set of circumstances would seem to be characteristic of the 10 year old child, in contrast to the 6 or 12 year old child. The 12 year old could be seen as representing

the other end of the modeling spectrum, the generalized dominance of the peer model instead of the adult model. The 12 year old has already acquired much knowledge, many of the basic inter-personal skills, and a system of social relationships in which conformity to peer cultures and peer approval are highly reinforcing. It is suggested, therefore, that these three age-grade ranges may be considered representative of a model-potency continuum. The 6 year old group would be characterized by generalized high adult model potency, the 10 year old group by lower, less generalized adult model potency, and the 12 year old group by low adult model potency and generalized high peer model potency. The use of these three age-grade levels should enable one to test the assumption that there are differences in model potency between adult and peer models as observer age increases.

Hypotheses

1. Imitation will occur at all 3 age levels and on all 5 tasks, though not necessarily at each age level on each task.
2. There will be differences in adult versus peer model potency among the three age levels on each of the five tasks.
3. The adult model will be more potent than the peer model at the lowest age level, and the peer model will be more potent than the adult model at the highest age level on tasks 2 to 5.
4. There will be differences in modeling situation potency among the three modeling situations on each of the five tasks.
5. The highest age level will show less superstitious-irrelevant behavior on the superstitious-irrelevant task than the lowest age level.

Method

Subjects

Male subjects were used exclusively. The total populations of male students from the first, fifth, and seventh grades of the P.K. Yonge Laboratory School, Gainesville, Florida were used.

The P.K. Yonge Laboratory School is a department in the College of Education of the University of Florida and has an enrollment of approximately 930 students. Sixty pupils are enrolled in each grade from kindergarten through the seventh grade, with an equal number of males and females in each grade. Part of the school's enrollment formula is that 50% of the pupils in each grade are children from the families of the academic faculty of the University of Florida. The school devotes much attention to the individual student and provides pre-internship participation and observation experiences for undergraduate students in various fields. Practicum experiences for graduate students are also provided. The school serves as a research center for educational and behavioral science endeavors.

There was a total of 79 subjects used, 24 first graders, 28 fifth graders, and 27 seventh graders. This represented all the males in each grade except a few who were absent from school and missed the experimental sessions. The subjects in each age-grade level were randomly assigned to the three treatment groups--a control group and two experimental groups--by using a table of random numbers and the procedure suggested by Lindquist (1956). The number of subjects in each age and treatment group can be seen in Table 1.

Table 1

Number of Subjects in Each Grade-Treatment Group

	Treatment Group			
Grade Level	C	E1	E2	Total
1	8	8	8	24
5	9	11	8	28
7	9	10	8	27
Total	26	29	24	79

The mean age of the first graders was 6.7 years with a range of 75-85 months. The mean age of the fifth graders was 10.7 years with a range of 122-133 months. The mean age of the seventh graders was 12.6 years with a range of 144-158 months.

The three peer models were children of colleagues of the experimenter. None of the peer models was from P.K. Yonge Laboratory School. The ages of the first, fifth, and seventh grade models were 6 years 9 months, 10 years 2 months, and 11 years 9 months, respectively. The adult model was a 25 year old psychology graduate student.

Tasks and Apparatus

There were five tasks or types of behavior under study. These five tasks were presented to the subjects by way of video tape. Each group at each age-grade level was presented with a different video tape via closed circuit television. The control group video tape consisted of the exper-

imenter presenting the task materials and instructions. The video tape for the first experimental group consisted of the same presentation of the task materials and instructions as contained in the control group tape with the addition of a peer and an adult doing each of the tasks in contrasting ways. The video tape for the second experimental group was exactly like the first experimental group tape except that the model roles were reversed. (See Appendix A.) Consequently, seven video tapes were made. The same tape was used in all three control groups, but each of the experimental groups had its own separate tape.

The five tasks were as follows:

1. *Superstitious-irrelevant task:* First, a finger oscillation device was presented. This device consisted of two 5-digit counters, mounted on an 11 x 6 piece of wood, which automatically recorded the number of taps. The experimenter stated that some people think tapping brings good luck and helps them perform better on the tasks. He also stated that one could tap as much as one wanted to, immediately, and at any time while doing the tasks. One model said, "I think I'll tap." He then tapped 25 times, initially, and 25 times between each task for a total of 100 taps. The other model said, "I think I won't tap." He did not tap at all, initially, nor at any other time during the tasks.

2. *Guessing task:* Second, a glass jar containing 500 dried beans was presented. The experimenter posed the question of how many beans there were in the jar. One model guessed 300 beans, and the other model guessed 700 beans.

3. *Risk-taking task:* Third, a dart board composed of 5 concentric circles was presented. The experimenter explained that the closer to the center of the board the darts hit, the higher the score. The circles scored 10, 25,50, 75, and 100 points. The experimenter further explained that points could also be scored depending on how far from the board one stood to throw the darts. Sixteen marks numbered 0 to 15, each one-half foot apart, were pointed out on the floor. The closest one could stand was at line 0, 4 feet from the board, and the farthest away one could stand was line 15. The number of the line at which one stood was added to the score of whatever each dart hit on the board.

It was emphasized that the closer one stood to the board, the easier it was to hit the high point circles; but the farther away one stood, the more points one got added to what the dart hit on the board. There were five darts to throw. All had to be thrown from the same line, whichever line was chosen.

The one model said, "I think you can score the most points by throwing from line 15,"and threw from line 15. The other model said, "I think you can score the most points by throwing from line 0,"and threw from line 0.

4. *Spontaneous talking task:* Fourth, a microphone and tape recorder were presented in order to measure "tone of voice." Instructions were given to say whatever one wanted to say and as much or as little as one wanted to say. The one model said one word, "hello," and the other model used 75 words, relying on a previously prepared script.

5. *Drawing task:* Fifth, paper and 15 different colored pencils were presented. Instructions were given to draw the best house one could draw in 5 minutes, using as few or as many colors as one wished to use. One model said, "I think I'll use all 15 colors in my drawing," and used all 15 colors. The other model said, "I think I'll use just 1 color in my drawing," and used just 1 color.

The role behaviors performed by the adult and peer models in the two experimental groups are presented in Table 2.

Table 2

Model Role Behaviors in the Two Experimental Groups

Task	E1		E2	
	Adult Model	Peer Model	Adult Model	Peer Model
1. Number of taps	100	0	0	100
2. Number of beans	700	300	300	700
3. Number of line	15	0	0	15
4. Number of words	75	1	1	75
5. Number of colors	15	1	1	15

The order of performance for the two models alternated from task to task in the order stated above in the task descriptions.

Procedure

The experiment took place at P. K. Yonge Laboratory School in January 1967. The subjects were run in the following grade order, seventh, first, and fifth. This order was determined by school space restrictions and commitments. The experiment lasted 6 days, and each grade was run in 2 days. The three groups per grade were run in the following order. The C and E1 groups were run the first day in the morning and afternoon, respectively. The E2 group was run the morning of the second day.

The following experimental procedure was used for each group. The group was called as a group and taken to the experimental room by the experimenter. At this time no task apparatus was in sight, only the video tape equipment. The experimenter then introduced himself and the situation, told the subjects what the procedure was going to be, and gave the instructions. (See Appendix B.) The situation was presented as an attempt to find out how well boys of different age and grade levels could do on the tasks. Following an opportunity to ask questions, the group was shown the appropriate video tape and then sent back to their classrooms. The experimenter then set up the task apparatus, called each of the subjects individually into the room, had him perform each of the tasks, and sent him back to his classroom. Each subject was asked the same questions and given the same instructions during his individual performance. (See Appendix C.)

The length of the control group video tape was 7 minutes. The six

experimental group video tapes were approximately the same length, ranging from 13 1/2 to 16 minutes. The mean individual subject-running time was 9.6 minutes and ranged from 8.0 to 11.1 minutes.

Scoring and Analysis

The tasks were scored as follows:

Task	*Scoring*
1. Superstitious-irrelevant behavior	Number of taps
2. Guessing behavior	Number of beans guessed
3. Risk-taking behavior	Number of line
4. Spontaneous talking	Number of words
5. Drawing behavior	Number of colors

The experimenter recorded the subject's estimate on tasks 2 and 3. The subject's behavior on tasks 1, 4, and 5 was recorded automatically on the counter, tape, and paper, respectively, and thus required no active scoring by the experimenter in the presence of the subject.

The scores for each task were analyzed with a 3 x 3 unweighted means analysis of variance (3 age-grade levels x 3 modeling situations) and Newman-Keuls' tests on row and column groupings of cell means. The hypotheses of the investigation are mostly concerned with cell mean differences. Therefore, row and column cell means were compared even when one of the two *F's* was not significant or when both were not significant but the interaction *F* was significant (Winer, 1962).

Hypothesis 1, concerning the presence of imitation, was tested by comparing the three treatment means at each age-grade level. A significant difference between either of the experimental groups and the control group was defined as establishing the presence of imitation at that age-grade

level. If such a difference occurred at least once in each of the five tasks, and if each age-grade level showed a significant difference at least once, hypothesis 1 would be confirmed.

Hypothesis 2, concerning differences in adult versus peer model potency at each age-grade level, was tested by the analyses used to test hypothesis 1. However, for hypothesis 2, attention was focused on significant differences between the two experimental groups at each age-grade level. A significant difference between the two experimental groups at an age-grade level was defined as establishing the presence of a difference in model potency at that age-grade level. If such a difference occurred at least once in each of the five tasks, and if each age-grade level showed a significant difference at least once, hypothesis 2 would be confirmed.

Hypothesis 3, concerning directional differences in model potency related to observer age, was tested by employing the directional results of hypothesis 2. A significant difference in the predicted direction at both the lowest and highest age-grade levels on a task was defined as establishing the presence of a difference in model potency between the highest and lowest age-grade levels on that task. If such differences occurred on tasks 2 through 5, hypothesis 3 would be confirmed.

Hypothesis 4, concerning differences in modeling situation potency among the 3 age-grade levels, was tested by comparing the 3 age-grade levels under each of the three modeling situations. A significant difference between any two of the three age-grade levels under a modeling situation was defined as establishing the presence of a difference in potency for that modeling situation. If such a difference occurred at least once

in each of the five tasks, hypothesis 4 would be confirmed.

Hypothesis 5, concerning differences on the superstitious-irrelevant task related to observer age, was tested by comparing the main effects for the highest and lowest age-grade levels in the analysis of variance for task 1. A significantly lower total for the highest age-grade level than for the lowest age-grade level was defined as establishing the presence of less superstitious-irrelevant behavior in the highest age-grade level than in the lowest age-grade level. Such a difference would also confirm hypothesis 5.

For an over-all view, the scores for all five tasks were transformed into standard scores and analyzed in a 3x3x5 analysis of variance (age x modeling situation x task). Also, a procedural statistical control in the form of a Kendall coefficient of concordance was run on the five task scores for each subject in each treatment condition at each age-grade level to determine if task performance was affected by the amount of time elapsed between introduction to the tasks and the opportunity to perform the tasks.

The .05 level of significance was employed in all of the analyses.

RESULTS

Preliminary Findings

A Kendall coefficient of concordance was run on each of the nine age-treatment group conditions to determine if task performance was related to the amount of time between introduction to the tasks and the opportunity to perform. That is, with a mean subject-running time of approximately 10 minutes, over an hour elapsed between the first and last subject's chance to perform. The Kendall coefficient of concordance (W) was significant on only one of the nine groups, the seventh grade control group. However, even this group did not show a linear increase or decrease in scores as a function of time. These findings indicate that when the time period between the modeling stimuli and the opportunity to perform is short--1 to 2 hours--performance is not strongly influenced by temporal closeness or distance between modeling stimuli and opportunity to perform.

Main Findings

The main results of the experiment are seen in the six analyses of variance summaries (Tables 3 to 8) and the four summaries of Newman-Keuls comparisons of cell means (Tables 9,10,11,14). The cell means for the first five analyses of variance summaries have been plotted (Figures 1 to 5) to present a better picture of the location of each group on the various tasks. The scores for tasks 1, 2, and 4 were transformed to achieve homogen-

eity of variance, following significance at the .05 level on the Cochran test for homogeneity of variance, by the function: $x' = \log_{10} (x + 1)$ (Winer, 1962).

None of the five hypotheses were confirmed in the form originally stated. However, some support was found for hypothesis 1, and much support was found for hypotheses 4 and 5.

Hypothesis 1 predicted imitation, defined as a significant difference between E1 and/or E2 and C, would occur at all three age levels and on all five tasks, though not necessarily at each age level on each task. The above stated differences were found to be significant at only one age level, first graders, and on only one task, task 2. (See Tables 9 and 10.) Here both E1 and E2 differed significantly from C. However, during the course of the experiment a behavior was noted on task 1 which obviously differentiated the experimental groups from the control groups. This behavior was the number of times the finger oscillation device was used, as opposed to the number of taps which was scored on task 1. That is, the experimental video tapes showed the models either using the device multiple times or not at all. The control tape showed the experimenter explaining the device and using it one time for demonstration purposes. (See Appendix A.) These differences can be seen in Table 12 and Figure 6. The differences indicate the presence of imitation on task 1 across the three age-grade levels. In addition, when imitation in terms of responses identical to model responses (e.g., 100 or 0 responses on task 1, a guess of 700 or 300 on task 2, etc.) is considered across age and task, one finds differences between control and experimental groups. (See Table 13 and

Figure 7). This analysis included as a task the behavior discussed immediately above. Consequently, when viewed in terms of number of responses identical to responses of models and when viewed across age and task instead of separately by age and task, one can see that in an over-all manner some imitation did occur. Also, imitation occurred more strongly in E2 than in E1.

Hypothesis 2 predicted differences in adult versus peer model potency, defined as significant differences between E1 and E2, among the three age levels on each of the five tasks. From Table 11 it can be seen that such a difference was found at only one age level, first graders, and on only one task, task 2.

Hypothesis 3 predicted that the adult model would be more potent than the peer model at the lowest age level and vice versa for the highest age level. Potency was defined in terms of the direction of the E1-E2 difference. If the E1-E2 difference was positive, this indicated adult model potency because the adult model displayed high task behaviors in the E1 situation and low task behaviors in the E2 situation, while the peer model displayed low task behaviors in the E1 situation and high task behaviors in the E2 situation. Conversely, a negative E1-E2 difference indicated peer model potency. Again from Table 11 it can be seen that, as noted under hypothesis 2, there was only one significant difference in model potency. This significant difference, however, was in the direction opposite that predicted in hypothesis 3. At the first grade level the direction of the difference in model potency was in the predicted direction on three of the five tasks but not significant. At the seventh grade level

the difference in model potency was in the predicted direction on only one of the five tasks. It was only on task 4 that both the first and seventh age-grade levels had differences in model potency in the predicted directions.

Hypotheses 4 and 5 were not confirmed. However, the data presented below strongly indicate that these two hypotheses deserve more study.

Hypothesis 4 predicted differences in modeling situation potency on each of the five tasks. This was defined as differences on a task in the three age-grade levels among the three treatment groups. Significant differences were found on four of the five tasks, tasks 2,3,4, and 5, as can be seen in the three treatment groups under each task in Table 14. Differences also occurred on task 1, but were significant only at the .10 level. In terms of scoring highest, lowest, and in between the highest and lowest, Table 15 summarizes the score-ranks of Table 14 for each level according to treatment group. The summation across treatment groups reflects the score placements in the control group. The seventh graders scored highest most often, the first graders scored lowest most often, and the fifth graders scored in between most often.

Hypothesis 5 predicted that the highest age-grade level would show less superstitious-irrelevant behavior than the lowest age-grade level. This was indeed the case as can be seen from Table 3 and Figure 1. The seventh graders scored lower in all three treatment groups on task 1 than did the first graders. However, the seventh and first grade row means in the task 1 analysis of variance differed less strongly than predicted. The difference was significant at the .10 level but not at the .05 level.

Finally, from an over-all standpoint, Table 8 represents the results when the scores for all five tasks were transformed into standard scores and analyzed in a 3 x 3 x 5 analysis of variance (age x modeling situation x task). No significant main effects of age, modeling situations, or task were found. However, the significant age x task and age x modeling situation x task interactions indicate that the main effects were masked. That is, task behavior was dependent on the combination of age and task as well as the combination of age, modeling situation, and task presented to the subject, not just on one of the three factors. The highly significant age x task interaction also emphasizes the importance of the task in determining the nature of the results at the different age levels.

Consequently, in terms of differences significant at or beyond the .05 level, the results of this experiment provide evidence that imitation occurs across the three age-grade levels considered but in a less powerful and less age-related manner than hypothesized. The results also indicate that there is practically no significant differential imitation of adult and peer models as a function of observer age or type of task. Most of the differences in task behavior found when the tasks were considered individually were a function of main effects, primarily age, instead of the predicted age-treatment group interactions. However, the score-ranks in Tables 14 and 15 indicate that these age differences were task-related and affected by treatment group. These interactions are demonstrated in Table 8 where age, modeling situation, and all five tasks were analyzed in a 3 x 3 x 5 analysis of variance. The high age-task interaction emphasizes

the importance of the task used to study modeling and the need to employ more than one task in such studies. This finding confirms the criticism made earlier concerning the tendency in previous research to use one task and the lack of valid generalization that results.

Table 3

Summary of Analysis of Variance for Task 1: Superstitious-irrelevant Behavior[a]

Source	SS	ds	MS	F
A (age)	2.67	2	1.34	2.53b
B (models)	2.58	2	1.29	2.43b
AB	4.81	4	1.20	2.26b
Within cell	37.37	70	.53	

[a] Scores transformed by the function: $x' = \log_{10}(x + 1)$

[b] $p \leq .10$

Table 4

Summary of Analysis of Variance for Task 2: Guessing Behavior[a]

Source	SS	df	MS	F
A (age)	.27	2	.14	NS
B (models)	1.34	2	.67	6.70**
AB	.18	4	.04	NS
Within cell	7.41	70	.10	

[a] Scores transformed by the function: $x' \times \log_{10}(x + 1)$

** $p \leq .01$

Table 5

Summary of Analysis of Variance for Task 3: Risk-taking Behavior

Source	SS	df	MS	F
A (age)	423.85	2	211.92	10.38***
B (models)	47.04	2	23.52	NS
AB	73.24	4	18.31	NS
Within cells	1428.87	70	20.41	

*** $p \leq .001$

Table 6

Summary of Analysis of Variance for Task 4: Spontaneous Talking Behavior[a]

Source	SS	df	MS	F
A (age)	4.90	2	2.45	12.25***
B (models)	.18	2	.09	NS
AB	.89	4	.22	NS
Within cells	13.90	70	.20	

[a] Scores transformed by the function: $x' = \log_{10}(x + 1)$

*** $p \leq .001$

Table 7

Summary of Analysis of Variance for Task 5: Drawing Behavior

Source	SS	df	MS	F
A (age)	51.41	2	25.70	2.41[b]
B (models)	4.54	2	2.27	NS
AB	113.96	4	28.49	2.67*
Within cells	746.25	70	10.66	

[b] $p \leq .10$

* $p \leq .05$

Table 8

Summary of Analysis of Variance of Task Behavior as a Function of Age, Modeling Situation, and Task[a]

Source	SS	df	MS	F
Between subjects				
A (age)	348.92	2	174.46	-
B (modeling situation)	225.16	2	112.58	-
AB	1737.81	4	434.45	1.48 NS
Subjects within groups	20535.14	70	293.36	
Within subjects				
C (task)	51.41	4	12.85	-
AC	5130.38	8	641.30	9.32**
BC	1043.63	8	130.45	1.90 NS
ABC	2751.85	16	171.99	2.50**
C X subjects within groups	19259.24	280	68.78	

[a] Scores transformed into standard scores: $\overline{X} = 50$, $SD = 10$

** $p < .01$

Table 9

Summary of Newman-Keuls' Tests on C Minus E1 Differences for Tasks 1 Through 5

Grade	Task 1	Task 2	Task 3	Task 4	Task 5
1	-	-*	+	-	-
5	+	-	+	-	+
7	+	-	+	+	+

* $p \leq .05$

Table 10

Summary of Newman-Keuls' Tests on C Minus E2 Differences for Tasks 1 Through 5

Grade	Task 1	Task 2	Task 3	Task 4	Task 5
1	+	-**	+	+	-
5	+	-	+	-	-
7	+	-	+	+	+

** $p \leq .01$

Table 11

Summary of Newman-Keuls' Tests on E1 Minus E2 Model Potency Differences for Tasks 1 Through 5

Grade	Task 1	Task 2	Task 3	Task 4	Task 5
1	+	-**	-	+	+
5	-	+	-	-	-
7	+	0	+	-	+

** $p \leq .01$

Table 12

Usage Across Age of the Finger Oscillation Device

Times Used	C	E1	X^2	E2	X^2
1	24	14	10.47**	10	12.47***
±1	2	15		14	

** $p \leq .01$

*** $p \leq .001$

Table 13

Number of Responses Identical to Responses of Models Across Six Tasks

Responses	C	E1	X^2	E2	X^2
Identical	24	41		40	
			3.0^{b}		6.1^{**}
Dissimilar	132	133		104	
Total Responses	156	174		144	

[b] $p \leq .10$

[**] $p \leq .02$

Table 14

Differences in Modeling Situation Potency

Score-rank of Anova cell mean	Task 1	Task 2	Task 3	Task 4	Task 5
		C			
Highest	5	7^{**}	7^{*}	7^{*}	7
Middle	1	5^{**}	5^{*}	5^{**}	5
Lowest	7	1	1	1	1
		E1			
Highest	1	5	7^{*}	7	1^{**}
Middle	7	7	5^{*}	5	7
Lowest	5	1	1	1	5
		E2			
Highest	5	1	5^{*}	7^{**}	1
Middle	1	5	7	5^{**}	5
Lowest	7	7	1	1	7

[*] $p \leq .05$

[**] $p \leq .01$

Scores joined by a common line do not differ significantly from each other and vice versa.

Differences tested by Newman-Keuls' test.

Table 15

Summary of Score-ranks in Treatment Groups Across the Five Tasks

Score-rank of Anova Cell mean	C			E1			E2			Total		
	1	5	7	1	5	7	1	5	7	1	5	7
Highest	0	1	4	2	1	2	2	2	1	4	4	7
Middle	1	4	0	0	2	3	1	3	1	2	9	4
Lowest	4	0	1	3	2	0	2	0	3	9	2	4

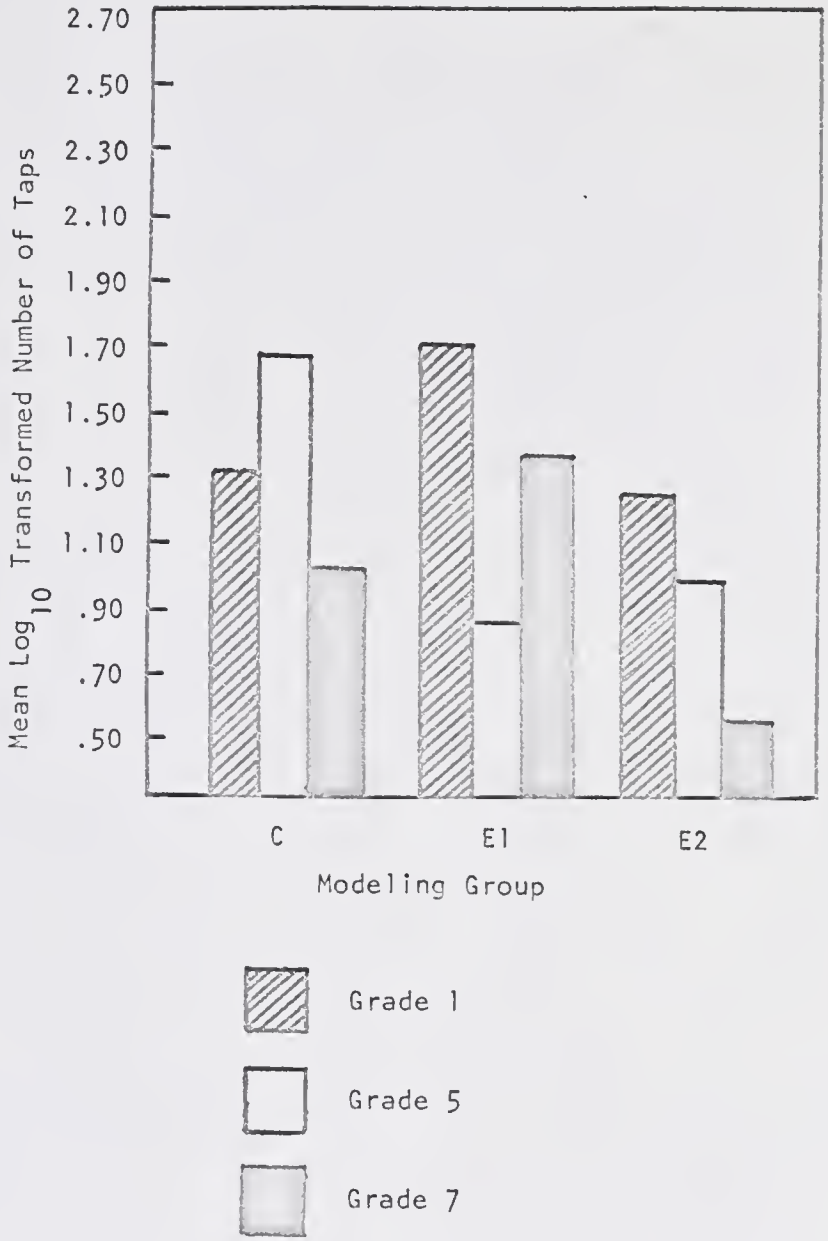

Figure 1. Scores on Task 1 According to Age and Modeling Group.

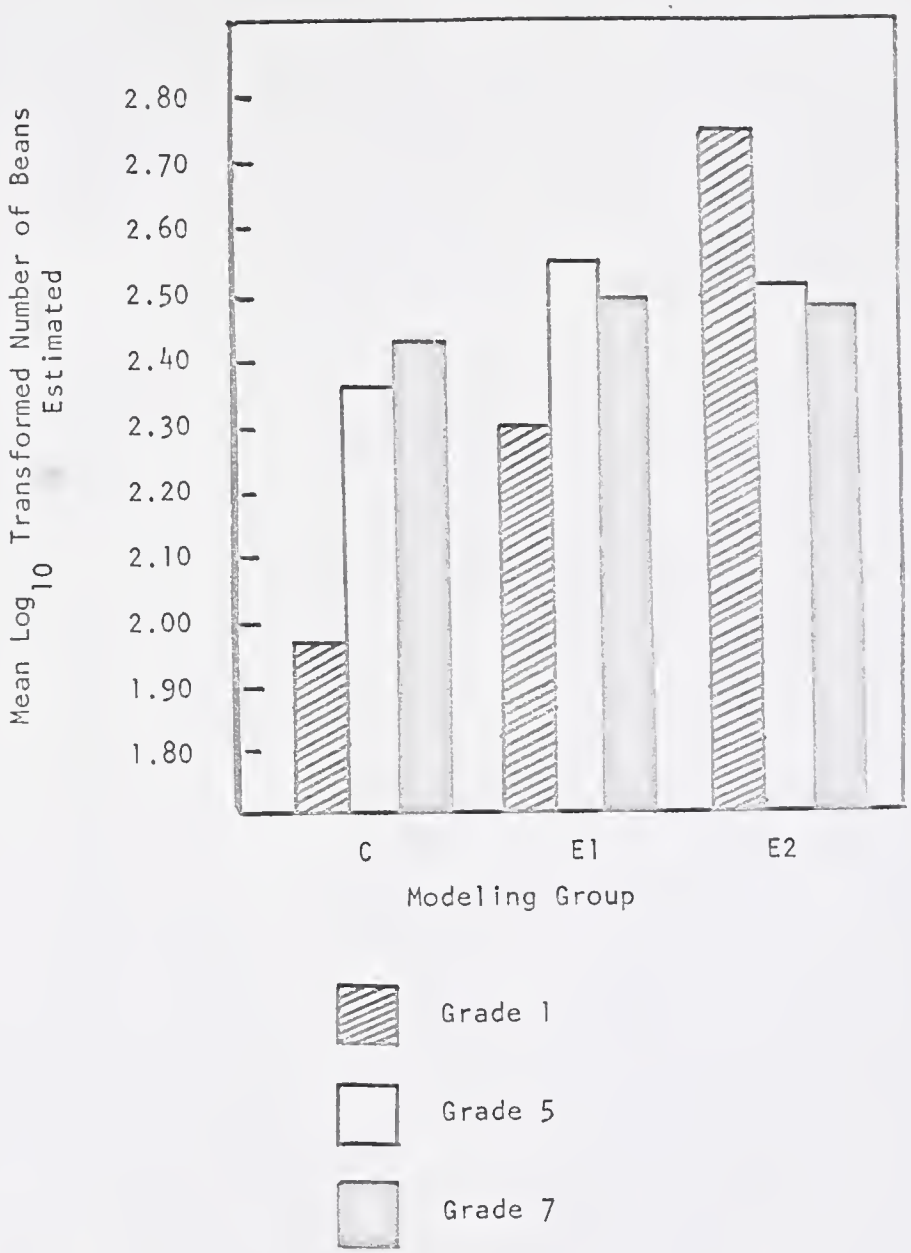

Figure 2. Scores on Task 2 According to Age and Modeling Group.

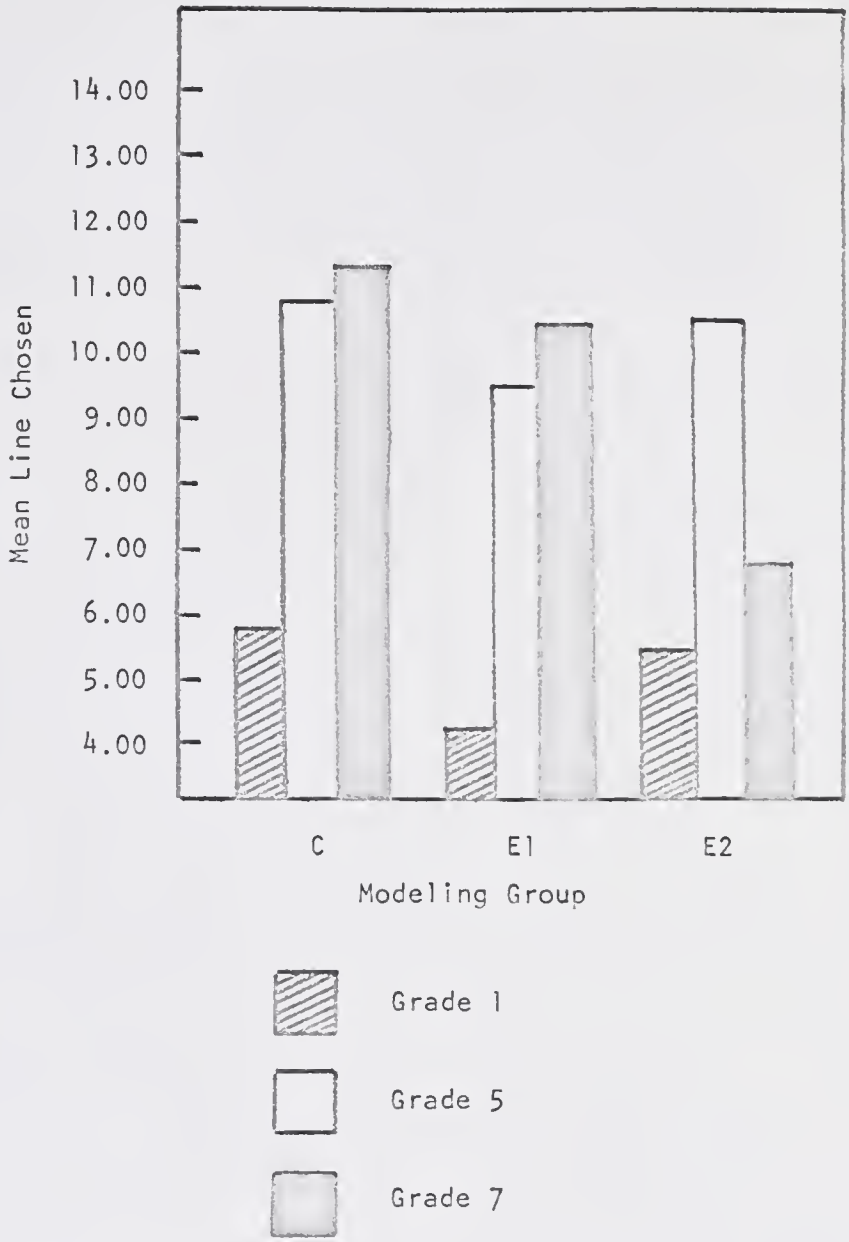

Figure 3. Scores on Task 3 According to Age and Modeling Group.

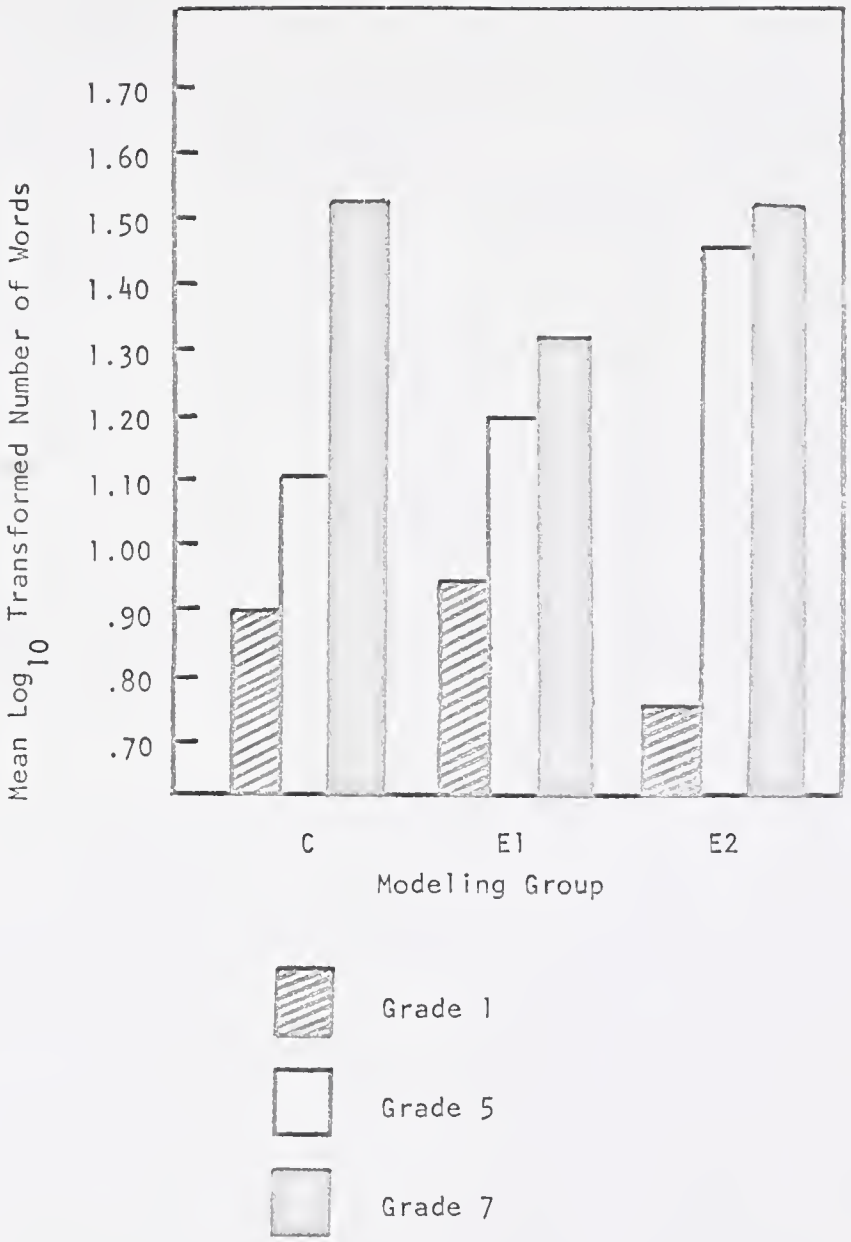

Figure 4. Scores on Task 4 According to Age and Modeling Group.

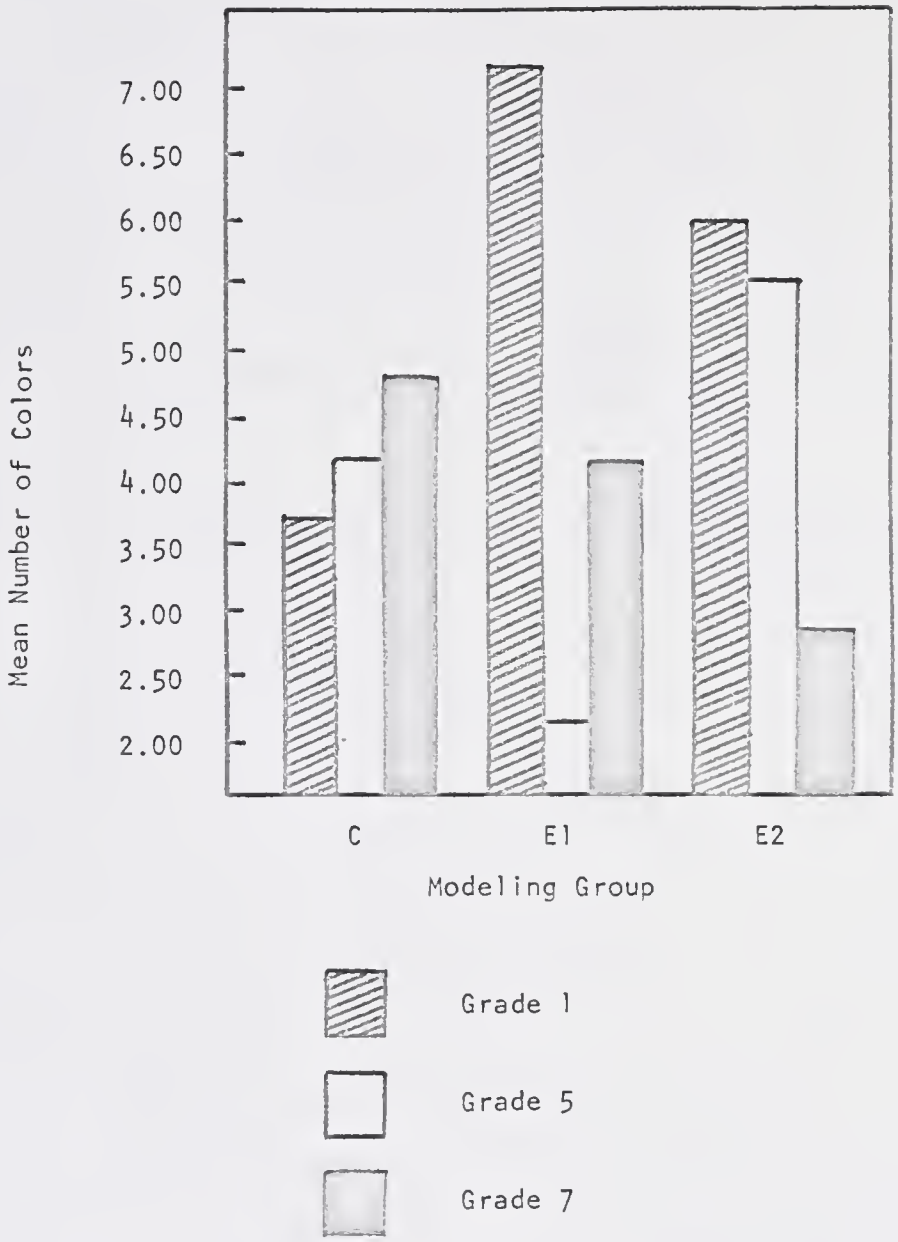

Figure 5. Scores on Task 5 According to Age and Modeling Group.

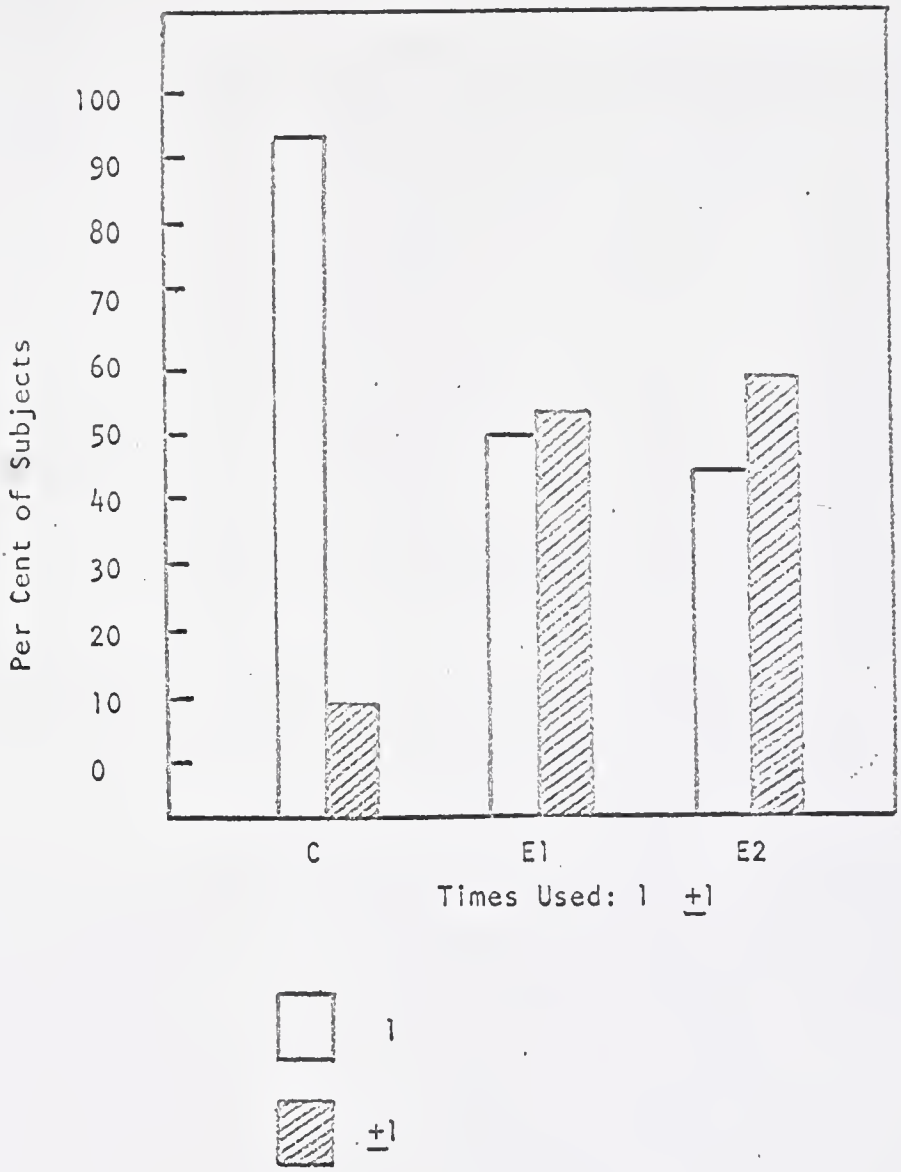

Figure 6. Usage Across Age of the Finger Oscillation Device.

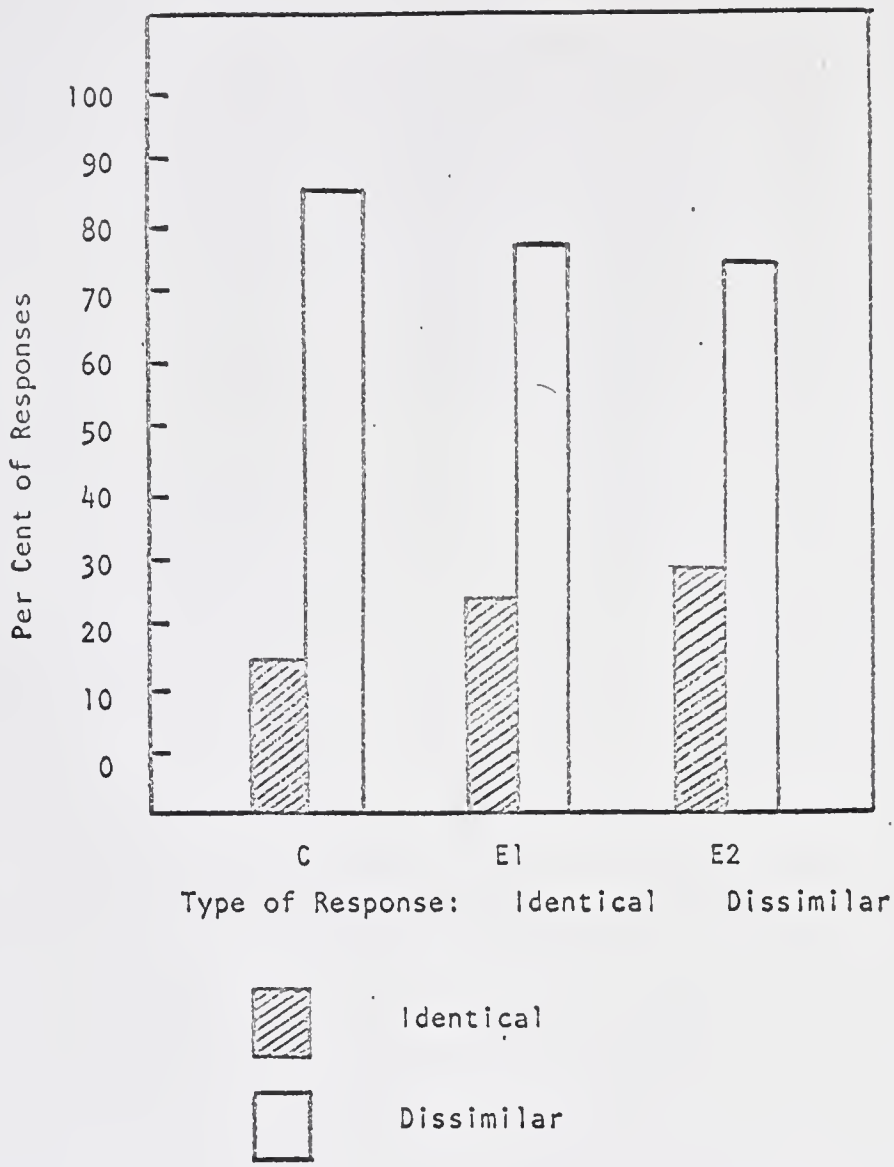

Figure 7. Responses Identical to Responses of Models Across Six Tasks.

DISCUSSION

Given the indications of imitation when age levels are combined, the main question arising from these results is why there is a lack of imitation per se according to age level and of differential adult and peer imitation according to age level. The following considerations seem to contain the most relevant issues.

The Multi-model Choice Situation

A two-model peer-adult situation of the type employed in this study is unique in the modeling literature, to the knowledge of the experimenter. Such a situation presents a more complex stimulus and choice situation to the subject than the one model situation. As Bandura (1965a) points out, children observing multiple adult models will not necessarily perform as smaller replicas of a model but may combine components of both models' performances in their response to produce a "new" response. In other words, imitation can occur without a subject's response being just like the response of one of the models. Therefore, the "new" response given by the subject in this experiment (a response between the response of the two models) may have represented a constructive attempt to incorporate aspects of both models' performances and have been truely imitative, but not of one model only. The assessment of this is discussed later in relation to dependent variable measures. The concern of this experiment with the effects of multiple peer-adult models reflects Bandura's statement (1965a, p. 338): "...learning principles based on a two-person model

[one model, one subject] may be subject to strict limitations, since the introduction of additional social variables can produce significant changes in the functional relationships between relevant variables." The lack of strong imitation and differential imitation according to age (imitation of one model exclusively) may be one of the effects of observing two models of different ages perform in contrasting ways.

Effects Related to Reinforcement

On the other hand, most of the previous experiments have been concerned with the effects on imitation of variables other than age of model alone--reinforcing consequences to the model (Bandura, Ross, and Ross, 1963c), response consequences to the model (Bandura, 1965b), model's evaluation of responses or standard setting (Bandura and Kupers, 1964; Mischel and Liebert, 1966; Bee and Colle, 1967), and model's rewarding power and control of future resources (Bandura, Ross, and Ross, 1963z; Mischel and Grusec, 1966). In the present experiment there were no model response evaluations, consequences, rewarding powers, controls of future resources, or reinforcements either by the models themselves or by anyone else. With no reinforcements, evaluations, etc.,of either model presented to the subject, model age would seem to be the most outstanding difference between the two models in the present study. The results indicate that the age of the model may not be a very potent factor apart from reinforcement.

Effects of Perceived Similarity

However, an alternative answer to the influence of reinforcement was suggested in a recent study by Rosekrans (1967) on a group of 11 to 14 year old boys. She found evidence that perceived similarity of the

subject to the model (in terms of interests, skills, background, and group membership) was a factor affecting both frequency of imitation and size of imitative behavior repertoire. Both the frequency of imitation and the size of the imitative behavior repertoire were greater when the observer perceived himself as similar to the model than when the observer perceived himself as dissimilar. Positive and negative response consequences to the model had only minimal differential effects on imitation. Evidence was also found which indicated that the learning as well as the performance of imitative responses was increased by high perceived similarity. The results of Rosekrans' study indicate that perceived positive similarity may be a more influential variable than response consequences in producing imitation.

Special Characteristics of Subject Population

In terms of methodological considerations, it would be important to replicate this study on another population of first, fifth, and seventh graders and compare the results with the present findings on the P.K. Yonge Laboratory School population. This is important because the P. K. Yonge Laboratory School population is a somewhat atypical student population. As mentioned previously in the description of the school, one-half of the students are from families of academic faculty at the University of Florida. The student population could be described over-all as relatively high in intelligence and socio-economic status. The students are given individual attention and encouraged in individual pursuits. Also, the students are continually participating in experiments and are sophisticated concerning experimental procedures. In other words, the P.K. Yonge Laboratory School population could be described as having a nonimitative bias. However, the

fact that even on such a population imitation was found, albeit not as powerfully as predicted, suggests both that imitation is a factor involved in determining what behavior a child displays, and that much stronger imitation might occur in children without the special characteristics of the children in this population. The effects of intellectual level and socio-economic status are still to be determined. A study now in progress (O'Connor, 1967), investigating the relationships of imitation to intellectual level, socio-economic status, and achievement in white and Negro first grade children, should make the importance of these variables clearer.

The Task in Imitation Research

In terms of dependent variables, this experiment shows that the kind of task one uses has an influence on the results one finds. The difference between the oldest and youngest subjects on the superstitious-irrelevant task offers evidence that imitation becomes less obvious as age increases as a function of increasing ability to discriminate between behaviors relevant and irrelevant to the situation or task. That is, imitation becomes more focused and "reasoned." This in turn leads to a decreasing need to respond in exactly the same manner as the model. It follows, therefore, that the more unfamiliar the task, the more difficult it is to make the discrimination between the relevant and irrelevant dimensions. Consequently, it is more necessary to employ such unfamiliar tasks as age increases in order to reveal the imitation that may be occurring. The tasks employed in this experiment probably erred on the side of being too familiar and/or unstimulating--i.e., subjects had previously established response tendencies on the tasks. It could be said that the primary imitation data in the

experiment were found on the task which, in the opinion of the experimenter, was the most novel and stimulating. This was task 1, the superstitious-irrelevant task. From the observations of subject behavior, this opinion seemed to be confirmed. As mentioned above, it is hypothesized that the more familiar the task the more likely one is to know the relevant and irrelevant dimensions and feel comfortable in relying only on oneself in handling the task. This is the case because of having had past experience with the task and having the consequent response tendencies or repertoire associated with the task. If this is indeed true, task novelty is a critical variable in eliciting imitative behavior and assuming, as Bandura (1965a) points out when speaking of response facilitation effect, that the behavior in question is not likely to have been previously punished or to possess some kind of reinforcement history.

Measurement and the Dependent Variables

Concerning the measurement of the dependent variables, it appears that a reduction in the possible ways of responding on a task would result in a more precise measure of imitation. In the present study an attempt was made to provide many alternative responses to a task and to allow imitation to vary in intensity. As a consequence, response continua were provided for each task with the models' responses representing both ends of the continuum. This procedure, while seeming to provide a task situation more comparable with daily encountered task situations, made it more difficult to know whether or not an individual response was imitative. By employing task situations with more discrete but previously shown equally attractive response alternatives, one could achieve a clearer response classification.

For example, one could allow only four discrete responses to a task--the adult model response, the peer model response, a response incorporating some aspects of both the adult and peer models' responses, and a response displaying none of the aspects of the above three responses. This situation would make a non-imitative attempt by the subject clearer. This situation would also prevent extremely deviant scores, which were possible and found on the open ended tasks, tasks 1,2, and 4, where it was possible to respond higher than the model displaying the high task behavior. The resulting deviant scores on these tasks necessitated the score transformations as previously indicated on tasks 1,2, and 4.

Foci for Future Research

It would be important to know whether the finding that filmed models can be as effective as live models, established with nursery school children (Bandura, Ross, and Ross, 1963b), holds across age. This could be determined by using live and video-tape models at several age levels. The characteristics of the observation and performance situations should also be investigated. In the present study the subject observed the modeling stimuli in a group of peers. This could be compared with situations in which the subject observes the modeling stimuli alone or with adults. In the present study the subject performed in the presence of an adult, the experimenter. This situation could be compared with one in which the subject performed alone, in the presence of a peer, or in the presence of a group.

In addition to all of the above considerations there is still the question of sex differences which was not addressed in this research, and

the effects resulting from the various combinations of this variable with the variables previously discussed.

From the modeling literature and the present study, the following factors and directions seem to be the most salient for future research in this area:

1. Comparison of multiple versus single model situations;
2. Discrete response categories on tasks in multiple model situations;
3. Response consequences versus no response consequences to models in multiple model situations;
4. Task novelty;
5. Effects of perceived similarity in multiple model situations;
6. Filmed versus live models on older children;
7. Manipulations of the performance situation such as individual versus group observation of stimuli, observation group composition;
8. Manipulations of sex differences in models and observers.

SUMMARY

This investigation attempted to assess the effects of multiple observer ages and types of tasks on the imitation of adult and peer models when both adult and peer models are observed by the subject. First, fifth, and seventh grade males were randomly divided in each grade into two experimental groups and one control group. Seventy-nine subjects were used. The three groups received different modeling stimuli as a group via video-tape. The control group video-tape consisted of the experimenter presenting the materials and instructions for the five tasks. The video-tape for the first experimental group consisted of the same presentation of the task materials and instructions as contained in the control group tape with the addition of a peer and an adult doing each of the tasks in contrasting ways. The video-tape for the second experimental group was exactly like the first experimental group tape, except that the model roles were reversed. The five tasks involved the following behaviors: tapping a finger oscillation device, guessing the number of beans in a jar, throwing darts, talking spontaneously, and drawing. Following the observation of the tape, the subjects were individually given the opportunity to perform each of the tasks to see if imitation per se occurred and whether the peer or adult was imitated.

It was found that with a time period of one to two hours between the modeling stimuli and the opportunity to perform, performance was not

substantially influenced by temporal closeness or distance from the observation of the modeling stimuli. Imitation was found to occur across the three age-grade levels considered but in a less powerful and less age-related manner than hypothesized. The results also indicated that there was practically no significant differential imitation of adult and peer models as a function of observer age or type of task. Most of the differences in task behavior found when the tasks were considered individually were a function of main effects, primarily age, instead of the predicted age-treatment group interactions. When all five tasks were considered together, significant interactions between age and task and among age, modeling situation, and task were found. Thus, task behavior was dependent on the combination of age and task as well as on the combination of age, modeling situation, and task presented to the subject, not just on one of the three factors. The high age-task interaction emphasized the importance of the task used in modeling research and the need to employ more than one task to get a good view of the nature of modeling at various ages.

The results were discussed in terms of the uniqueness of the two-model peer-adult situation in this study, the assessment of imitation in a two- versus a one-model situation, lack of response consequences to the models, the importance of subject variables, importance of task characteristics, and discreteness of response. Various experimental manipulations remaining to be studied were noted as well as factors and directions salient for future research.

APPENDICES

Appendix A

Approximate Transcript of Experimental Video Tape*

(Camera opens on experimenter, adult model, and peer model)

Experimenter: "Hello. What is your name?"

Peer Model: "My name is John Clemens." (Name assigned to all peer models.)

Experimenter: "How old are you, John?"

Peer Model: "I'm (appropriate number) years old."

Experimenter: "What grade are you in?"

Peer Model: "I'm in (appropriate)grade."

Experimenter: "And what is your name?"

Adult Model: "My name is Mr. Costanzo."

Experimenter: "How old are you, Mr. Costanzo?"

Adult Model: "I'm 25 years old."

Experimenter: "All right. Let's begin." (Camera on experimenter only.) First of all, I want to show you this finger oscillation device. All it is, is this little lever which you can push and a counter that counts the number of times you tap the lever. Like this. (Experimenter taps 5 times and lays the device down.) Some people think tapping brings good

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* The control group tape is the experimental tape with all model portions deleted. In the E1 situation Model 1 represents the adult model, and Model 2 represents the peer model. In the E2 situation Model 1 represents the peer model, and Model 2 represents the adult model.

luck and helps them perform better on the tasks; so I'm going to give you the chance to tap now, if you want to, as many times as you want to. Also, you may tap at any time while you are doing the other tasks. Do you want to tap?"

Model 1: (Camera on Model 1.) "I think I'll tap. (Taps 25 times immediately and 25 times between each task for a total of 100 taps.)

Model 2: (Camera on Model 2.) "I think I won't tap." (Never taps.)

Experimenter: (Camera on experimenter and container only.) "Okay. Next I have this jar filled with beans. I know the exact number of beans in the jar, but you do not. So I want you to try to guess the best that you can how many beans there are in the jar. How many beans do you think are in the jar?"

Model 2: (Camera on Model 2 and jar.) "I'll guess 300 beans."

Model 1: (Camera on Model 1 and the jar.) "I'll guess 700 beans." (Camera on Model 1 as he goes to tapping device and taps 25 times.)

Experimenter (Camera on experimenter and dartboard.) "Okay. Now here you see a dartboard and darts. You will notice that the closer to the center of the board your darts hit,the higher your score is. The rings score, going from the outside to the center of the board, 10, 25,50,75, and 100 points. However, you can also score points according to how far

away from the board you stand. On the floor (Camera switches to marks on floor) there are 16 marks numbered zero to 15, each one-half foot apart. (Camera on experimenter and marks.) The closest to the board you may stand is here at the first mark, and the farthest away you may stand is here at number 15. You get added to the score of whatever your dart hits on the board, the number of the line you stand at to throw. For example, if you stand at the first line, line 0, and throw a dart that hits the 25 point circle, you get 25 points. If you stand at line 15 and throw a dart that hits the 25 point circle, you get 40 points--25 for hitting the 25 point circle plus 15 points for standing at line 15. You should remember, however, that the closer to the board you stand the easier it is to hit the high point circles, but the farther away you stand the more points you get added to the score of what your dart hits on the board. You get 5 darts to throw. You must throw all 5 darts from the same line, whichever line you choose. It is up to you to choose the spot that you think you can score the most points from. Where do you want to throw from?"

Model 1: (Camera on Model 1 showing what line he is standing at and stays on him while he throws. The dartboard and where his darts hit are not shown.)

"I think you can score the most points by throwing from

line 15." (Throws from line 15.)

Model 2: (Camera on Model 2 showing what line he is standing on and stays on him while he throws. The dartboard and where his darts hit are not shown.)
"I think you can score the most points by throwing from line 0." (Throws from line 0.)

Model 1: (Camera switches to Model 1 and tapping device where Model 1 taps 25 times.)

Experimenter: (Camera on experimenter and tape recorder.) "Next I want to get a measure of the tone of your voice by having you talk into the microphone of this tape recorder. I want you to say as much or as little as you want to say. What do you want to say?"

Model 2: (Camera on Model 2.) "Hello."

Model 1: (Camera on Model 1.) "My name is (appropriate) and I live here in Gainesville, Florida. I had a nice Christmas and New Year vacation. I watched football games on TV and went to visit some of my relatives. I have hobbies, like to go fishing, read, play ball, go to the beach, swim, and I collect different things and like to go places. I wish I had more time to do some of these things I like to do." (Camera on Model 1 as he goes to tapping device and taps 25 times.) "Hey, I've tapped 100 times in all!"

Experimenter: (Camera on experimenter and table on which is paper and two sets of 15 different colored pencils.) "All right.

Here is some paper and 15 different colored pencils. I want you to draw the best house that you can draw. You may use as many or as few of the colors as you wish. You have 5 minutes to work on your drawing. You may go ahead now and begin to draw.

(Camera on Model 1 and Model 2 sitting side by side at the table.)

Model 1: "I think I'll use all 15 colors in my drawing."

Model 2: "I think I'll use just 1 color in my drawing."

(Camera stays on both models for 2 minutes during which Model 1 changes colors frequently and Model 2 continues with the same color. At no time are either the drawings or the kinds of colors visible.)

Experimenter: (Experimenter walks into picture behind the models after 2 minutes, following a brief fade-out and fade-in.) "Five minutes is up. Stop drawing. That's all the tasks there are. Thank you very much."

(End of tape.)

Appendix B

Group Instructions

Hello. I'm Mr. Musselman from the University of Florida. I have asked you to be here today to help me find the answer to the question I am studying. How well can boys and men of different ages do on the tasks I am going to show you? I have been giving these tasks to a few boys from other schools and to a few men, but I want to give them to many boys of the same age so I can tell how well boys of a certain age and grade can do on them. Because all of the boys in your grade will do the tasks, please do not tell them anything about the tasks or instructions so that the difficulty of the tasks is the same for them as it is for you.

Watch and listen to the instructions of how to do the tasks. I want you to do the best job you can possibly do on the tasks. Do each task in the way you think is the best possible way to do it.

This is what you are going to do. I will give you the instructions for the tasks and show you what the tasks are. Then you will go back to your classroom. You will be called one at a time to come and do the tasks. When you finish you will go back to your classroom and another one of you will come in and do the tasks. Let me again emphasize that you not talk about the tasks with each other or anyone else. I want you to do the tasks the way you think you can do them the best.

Okay. Now I want to show you what the tasks are and give you the instructions. Before we begin do you have any questions?

Control Group: I made a film of the instructions and tasks which I will show to you now.

Experimental Groups: I thought it would be a good idea to show you some people doing the tasks in addition to giving the instructions and showing you the equipment so that everyone would know how to do the tasks. So a few days ago while I was giving the tasks to some people, I asked if I could film two of them doing the tasks. They agreed and I filmed them. I will introduce them to you and then begin.

Appendix C

Individual Performance Procedure for Each Subject

Experimenter: (Subject enters room.) "If you have any questions now or anytime, please ask them."

Task 1: "Do you want to tap?"

Task 2: "How many beans do you think are in the jar?"

Task 3: "Where do you want to throw from?"

Task 4: "What do you want to say?"

Task 5: "I want you to draw the best house that you can draw. You have 5 minutes to work on your drawing. You may go ahead now and begin to draw."

(After five minutes:) "Five minutes is up. That's all. Thank you very much."

Appendix D

Summary of Row Scores

Task 1

Modeling Situation

Grade	Subject	C	E_1	E_2
1	1	2	44	0
	2	147	208	31
	3	52	363	12
	4	26	104	15
	5	18	0	11
	6	5	167	221
	7	65	12	13
	8	11	48	0
	9			
	10			
5	1	18	0	100
	2	414	0	50
	3	650	5	26
	4	55	0	29
	5	22	11	20
	6	18	14	0
	7	20	30	33
	8	19	60	39
	9	51	1	
	10		30	
	11		16	
7	1	0	35	0
	2	96	70	0
	3	31	0	30
	4	10	21	0
	5	295	1	79
	6	33	13	0
	7	1	26	0
	8	0	25	18
	9	259	22	
	10		0	

Task 2

Grade	Subject	C	E_1	E_2
1	1	50	100	104
	2	100	700	4000
	3	100	100	300
	4	100	300	700
	5	113	700	1000
	6	20	20	300
	7	500	400	1000
	8	100	200	500
	9			
	10			
5	1	400	500	400
	2	424	600	250
	3	1000	400	500
	4	250	150	150
	5	105	450	300
	6	200	270	200
	7	150	525	500
	8	150	250	500
	9	120	250	
	10		350	
	11		400	
7	1	300	350	200
	2	150	200	250
	3	357	400	500
	4	300	300	500
	5	275	300	350
	6	150	260	150
	7	150	250	500
	8	175	600	200
	9	1400	200	
	10		300	

Task 3

Grade	Subject	C	E_1	E_2
1	1	8	3	1
	2	8	1	15
	3	0	10	0
	4	10	0	2
	5	9	5	5
	6	7	0	0
	7	4	5	4
	8	0	9	15
	9			
	10			
5	1	10	6	5
	2	13	9	5
	3	15	15	15
	4	5	9	9
	5	6	15	15
	6	15	6	15
	7	10	7	5
	8	8	15	15
	9	15	13	
	10		0	
	11		9	
7	1	10	10	10
	2	10	15	15
	3	10	15	10
	4	10	5	10
	5	15	5	5
	6	15	15	0
	7	13	15	5
	8	10	9	0
	9	10	5	
	10		8	

Task 4

Grade	Subject	C	E_1	E_2
1	1	1	5	5
	2	12	18	8
	3	42	16	31
	4	1	6	1
	5	1	1	6
	6	35	11	1
	7	1	13	2
	8	45	6	8
	9			
	10			
5	1	22	5	50
	2	37	7	42
	3	4	19	24
	4	52	80	63
	5	68	23	25
	6	1	39	15
	7	6	7	22
	8	21	3	20
	9	1	31	
	10		10	
	11		20	
7	1	13	75	16
	2	46	14	44
	3	29	18	27
	4	37	43	47
	5	88	5	12
	6	148	25	17
	7	54	46	54
	8	1	38	102
	9	58	7	
	10		6	

Task 5

Grade	Subject	C	E_1	E_2
1	1	4	7	1
	2	3	8	7
	3	3	7	7
	4	7	15	3
	5	6	1	5
	6	4	8	9
	7	2	9	1
	8	1	2	15
	9			
	10			
5	1	12	3	5
	2	9	3	4
	3	3	4	10
	4	3	1	3
	5	3	6	2
	6	2	2	1
	7	1	1	15
	8	1	1	4
	9	3	1	
	10		1	
	11		1	
7	1	1	3	3
	2	5	3	2
	3	8	4	1
	4	3	5	2
	5	6	5	3
	6	4	11	6
	7	8	5	1
	8	3	3	5
	9	5	1	
	10		1	

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BIOGRAPHICAL SKETCH

Gerald Clemmer Musselman was born July 15, 1940, in Souderton, Pennsylvania. In June, 1958, he was graduated from Christopher Dock High School, Lansdale, Pennsylvania. In June, 1963, he received the degree of Bachelor of Science from Ursinus College, Collegeville, Pennsylvania. In 1963, he enrolled in the Graduate School of the University of Florida. He worked as a graduate assistant for the Departments of Psychology and Psychiatry. In August, 1965, he received the degree of Master of Arts. From September, 1965, to the present he has been pursuing work toward the degree of Doctor of Philosophy. In 1964 he was awarded a United States Public Health Service Fellowship which he held for two years. In 1966 he was awarded a Vocational Rehabilitation Administration Traineeship, which he still holds. At the present time he is completing his year of clinical internship at the J. Hillis Miller Health Center, University of Florida.

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This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Arts and Sciences and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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