

Model Status as a Determinant of
Observational Learning and Performance

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Abstract

The primary purpose of the present experiment was to determine if model characteristics influence observer performance by exerting their prime influence on the attentional phase of observational learning as predicted by Bandura (1969). A second purpose was to determine whether model characteristics affected actual amount learned or whether merely performance levels were affected by this manipulation. There were two experimental phases. During phase one, model status (High or Low) and time of cueing (Pre or Post Demonstration) were manipulated to test performance and attentional effects of model characteristics. During phase two, subjects were offered an incentive before performance trials in an attempt to make a learning versus performance distinction. Phase one results indicated the subjects viewing a high status model performed better than subjects viewing a low status model. The lack of any significant cueing effect suggested that model characteristics did not exert their prime influence on the attentional stage of observational learning. There were no group differences during phase two suggesting that performance but not actual amount learned was affected by the model status manipulation.

Model Status as a Determinant
of Observational Learning and Performance

The use of modeling as a technique for behavioral change is widespread. Not only has the technique of demonstrating skills to enhance performance been used in motor skill acquisition settings (e.g., Carroll & Bandura, 1985; Feltz, Landers & Raeder, 1977; Gould & Weiss 1981; Weiss, 1983), the viewing of a model has also been employed to modify phobias, anxiety, helplessness (see Meichenbaum, 1977) and has been used extensively in industrial settings to elicit employee behavioral change (see Robinson, 1982).

Over the years a variety of explanations have been proposed to account for imitative behavior. In general, these explanations have tended to concur with the psychological orientations current at that particular time. As would be expected, cognitive approaches (Bandura, 1969; Carroll & Bandura, 1985; Sheffield, 1961; Yando, Seitz & Zigler, 1978) have been postulated in recent years to account for the acquisition of new responses through observation. For example, according to Bandura's (1969) social learning theory, four sub-processes are presumed to govern observational learning. Attentional and retentional sub-processes are hypothesized to control the acquisition of responses while motor reproduction and motivation are presumed to primarily control performance (Bandura & Jeffrey, 1973).

The sub-process of primary focus in the present investigation was that of attention. If an observer is to perform a particular act previously demonstrated by a model, it is essential that the observer attend to the modeled behavior. Discriminative attention to relevant cues is essential if subjects are to acquire matching behavior. According to Bandura (1969), a number of variables are presumed to influence the attention phase. These include observer characteristics such as dependency and self-esteem, stimulus input characteristics including rate and number of demonstrations as well as instructional sets given to observers. Especially relevant to the present investigation are model attributes which may cause observers to differentially focus their attention on relevant cues. Although there is not a great deal of empirical evidence substantiating such a causal relationship, model characteristics such as competence (Baron, 1970; Gelfand, 1962), prestige (Mausner, 1953), status level (Landers & Landers, 1973), age (Bandura & Kupers, 1964), social power (Mischel & Grusec, 1966) and similarity (Gould & Weiss, 1981) have been shown to influence the degree of observational learning. To assess the hypothesized relationship between attention and recall, Yussen (1974) measured both the frequency and duration of observer attention to modeled events. Correlation of these measures with recall of the modeled behavior revealed reasonably high correlation coefficients (.55 to .79) leading the author to conclude that "level of attention influences level of learning in an

observational setting" (p. 99). A subsequent study by Yussen and Levy (1975) directly measured visual attention to determine if children paid more attention to a model with whom they had interacted warmly or to a model who had behaved neutrally. Results of a visual attention measures indicated that subjects paid significantly more attention to the warm model. Correlation of attentional measures with recall once again revealed a significant positive relation ($r = .53$ to $.57$).

As previously mentioned, the sub-processes of attention and retention are presumed to primarily affect acquisition (learning) whereas performance is predominantly regulated by motor reproduction and motivation. To substantiate such claims, it is necessary to make a clear distinction between acquisition and performance. An experiment by Bandura (1965) has provided us with such an example. Children were shown a film model demonstrating aggressive behavior under one of three vicarious reinforcement conditions. The model was either rewarded, punished, or received no consequences. Results indicated that subjects in the model rewarded and no consequence groups displayed more imitative responses than subjects in the model punished condition. To determine if subjects had actually learned different amounts or whether the previous group differences were merely performance differences, Bandura offered all subjects high incentives and rewards for each modeled behavior they could recall. With the introduction of high incentives, previous performance

differences were eliminated suggesting that all subjects regardless of reinforcement condition had actually learned similar amounts of information. Such a finding would suggest that reinforcement influences performance levels but not actual amount learned. Only limited attempts in the motor performance literature have made an adequate distinction between learning and performance (Ross, Bird, Doody & Zoeller, 1985) and in fact, the terms are at times used interchangeably.

Although skill demonstration is often used as a means of imparting information to the learner, little experimentation dealing with observational learning has been conducted by motor skill researchers (See Newell, 1981). In general, the studies have not examined the theoretical sub-processes of social learning theory but rather have focused on the benefits of televised models (Carre, 1972; Martens, Burwitz & Zuckerman, 1976; Mead, 1973; Nelson, 1958), feedback conditions (Carre, 1972; Kraft, 1973), temporal spacing of demonstrations (Landers, 1975) and model status and skill level (Landers & Landers, 1973). This latter experiment by Landers and Landers (1973) is illustrative of a motor performance study and may provide insight as to why model characteristics affect performance. In this experiment, subjects observed either a high or low status model demonstrate in either a skilled or an unskilled manner. The results indicated that subjects performed very well when a high status model demonstrated skillfully but performed very poorly after observing this same model display unskilled performance.

Performance after observing a skilled and unskilled low status model was intermediate to these two groups and in the opposite direction. Although this experiment did indeed demonstrate interesting interactive effects between model status and model ability level, the findings have not been related to the underlying cognitive processes presumed to mediate observational learning. For example, the significant differences between high and low status conditions when performance was skillfully demonstrated may be a result of differential attention, encoding or rehearsal processes after observing different types of models or may be a result of differential reinforcement expectations or motivation.

A subsequent experiment by Gould and Weiss (1981) manipulated model similarity and model self talk and assessed performance on a muscular leg endurance task. Performance differences between similar and dissimilar models in this study were suggested as providing "indirect" evidence for a motivational interpretation for observational learning effects. The authors suggested that many previous investigators had suggested that modeling effects exerted prime influence by providing information. Since the leg extension task used by Gould and Weiss "required all-out effort and very little learning" it was argued that "modeling is not only an important technique for conveying task-related motor performance information but, at times, may also play an important role in observer motivation" (p. 28).

According to Bandura, informational and motivational processes are both important. However model characteristics are presumed to exert prime influence on the attentional phase of observational learning whereas reinforcement contingencies are hypothesized to influence motivational processes. Therefore the purpose of the present experiment was to determine if model status characteristics exerted their prime influence on the attentional stage of observational learning as hypothesized by Bandura (1969). Furthermore, it was of interest to determine whether model characteristics affected learning or performance. In other words, are the advantages of model demonstration rather transient or of a more permanent nature. There were two phases to the experiment. The first phase was designed to investigate performance differences dependent on model characteristics. During this phase, model status (High or Low) and time of cueing for model status (Pre or Post Demonstration) were manipulated. In replication of Landers and Landers (1973), it was expected that subjects would perform better after observing a High as opposed to Low status model. Since model characteristics were hypothesized to influence the attentional phase of observational learning (Bandura, 1969) performance differences between High and Low status conditions would be expected in the pre-cued condition since subjects would have the opportunity to differentially focus their attention on the demonstration dependent on model status. In the post-cued condition, subjects were unaware

of model status at the time of demonstration. Subjects in the post-cued conditions saw the skill demonstrated and were then informed of the model's identity. Performance differences would not be expected in these post-cued conditions if model status were an attention controlling variable. A final group of control subjects performed without observing any model demonstration.

A final concern in the present experiment was whether model demonstrations had only a temporary or a rather lasting effect on motor performance. The second phase of the experiment was designed to make this learning versus performance distinction by using a transfer design. It may be that subjects performing in the absence of incentives are not sufficiently motivated to perform at an optimal level, and it is difficult under these situations to make inferences about how much they have actually learned. By introducing incentives and testing all experimental groups under similar conditions, it was presumed that subjects would display their learned behaviors (Bandura, 1969). Therefore, during the second phase of the experiment, all subjects in the four experimental groups received a short rest and were then offered an incentive to perform as well as possible. The no demonstration control group continued to perform during phase two without incentives.

Method

Subjects

The female volunteer subjects ranged from 11 to 14 years with a mean age of 12.97 years. An informed consent was signed by parents giving permission for student participation. Sample size per group (N=18) was determined by calculating power pre-experimentally (Kirk, 1968, p. 109). The order of testing was randomly determined before experimentation began. Subjects were assigned to groups on the basis of this random schedule. Each subject was tested individually.

Apparatus

The task was a 1.86 m free standing balance ladder devised by Bachman (1961). The total width of the ladder across the bottom was 36.5 cm and the rungs on both halves were separated by an upright. The rungs were made of 2.48 cm dowling and were alternately spaced up the ladder. On each side of the ladder the rungs were 13 cm apart as measured from the mid-point of one rung to the mid-point of the next. To reduce fear of falling while climbing, the ladder was placed in front of a tumbling mat while subjects performed. Subjects were required to wear tennis or soft-soled shoes to prevent slipping on the rungs. As suggested by Schmidt, Zuckerman, Martin and Wolfe (1971), subjects were scored on each discrete trial. The recorded score was the highest point to which the subject climbed without skipping any rungs.

Procedure

Phase one. Upon entering the testing room, subjects in the pre-cued high status model (Pre High) condition were seated and instructed to watch a film of a university cheerleader, dressed in uniform, perform a cheerleading stunt. Pre-experimentally, the teacher had recommended that such a person was held in considerable esteem by the students. After the brief film a still slide of the cheerleader was projected while she introduced herself on a tape recorded message indicating her interest in student ability to learn a balance task. She encouraged each student to do her best on the task. At this point the ladder task was introduced. Subjects were told to hold the ladder in front of them and to climb the ladder without missing any rungs. A film of the model now dressed in shorts and a blouse was shown to each subject. The model demonstrated six times and on each attempt reached rung six before dismounting. The model faced directly into the camera for the first three demonstrations, and the last three were from a side angle. After viewing the demonstration, a slide of the model dressed as a cheerleader was again projected and subjects were instructed by the cheerleader to begin 20 trials. All projections and messages were stopped at this time.

Subjects in the post-cued high status condition (Post High) received the same instruction as Pre High subjects with the order of presentation adjusted. These subjects first listened to the ladder

description instruction, followed by the film of the model demonstrating the skill. After this, the cheerleading sequence was viewed and finally the slide of the cheerleader was projected. At this point she introduced herself and encouraged each subject to do the best she could on the task. See Table 1 for manipulation sequence.

Insert Table 1 about here

In both the high status model conditions, subjects received identical instructions and demonstrations. The only difference between the Pre and Post cued manipulations was the point in time when subjects were informed of model status. Pre-cued subjects were introduced to the cheerleader on film before observing the demonstration while Post cued subjects were informed of model status after the demonstration.

Subjects in the pre-cued low status model (Pre Low) condition instead viewed a film of a young woman in street clothes entering a building (actually the same person who portrayed the cheerleader). After this brief film a slide of the person was shown and she introduced herself as a university student interested in student ability to learn a balance task. She encouraged students to do their best on the task which was similarly introduced as in the high status conditions. The film of the model demonstrating was then shown and finally the still slide was projected while the tape-

recorded voice of the university student instructed students to begin their 20 trials. Subjects in the post cued low status condition (Post Low) received the same instruction as above but once again the order of presentation was altered.

To determine if the filmed demonstration could enhance performance over verbal instructions, a group of control subjects was given no demonstrations. They were given similar instructions as the other groups concerning the ladder task and were encouraged to do their best before engaging in 20 performance trials.

In actuality, all subjects in the four experimental groups received the same instructions and the same filmed demonstrations. The same female portrayed both the high and low status roles and made the tape-recorded instructions which were identical except for the status manipulations. The experimenter remained in the room throughout the experiment to record performance scores for all groups.

Phase two. After performing the 20 phase one trials, subjects rested for approximately one minute. All subjects except the No Dem control group were shown the slide of either the cheerleader or university student dependent on their condition while the incentive instructions were delivered on the tape recorder. The incentive offered was a university sweat-shirt for the student who tried the hardest and climbed the highest on the ladder climb task. Students

were encouraged to do their best since everyone had a chance to win the prize. The No Dem group was also given a one minute rest but were not given any further instruction manipulations except a request to perform 20 more trials. All subjects received verbal outcome scores after each trial.

After completing phase two, subjects were thanked for their participation and were asked not to discuss the study with their friends. At this point, No Dem subjects were shown the prize and told that the student who had performed the best would receive it. On completion of all performance trials, subjects completed a questionnaire which included manipulation checks on model status, cueing and the effectiveness of the incentive. Informal debriefing was conducted by the teacher on completion of the experiment, and the prize was awarded to the student who had performed the best.

Design

Performance scores for phase one were compared within a 2 x 2 x 4 (Model Status x Cueing x Trial Blocks) independent groups factorial design with repeated measures on the last factor (Kirk, 1968, p. 283). There were two levels of model status (High and Low) and two levels of cueing (Pre and Post). The performance scores across the 20 trials were collapsed into four blocks and were the repeated measures factor. This factorial design was additionally compared to the control group (No Dem) using Dunn's multiple comparison procedure (Kirk, 1968, p. 79). This procedure was chosen

since it allows the investigator to make numerous orthogonal comparisons among means while controlling over-all error rate.

The design for phase two was similar to that employed during phase one. Experimental subjects were offered an incentive and their performance was compared within a 2 x 2 x 4 (Model Status x Cueing x Trial Blocks) factorial design with repeated measured on the last factor. This factorial design was additionally compared to the No Dem group.

Results

The experiment consisted of two phases and since it was of interest to make a learning versus performance distinction, it was deemed necessary to analyze the phases separately. The 20 performance scores attained by each subject during each phase were collapsed into four blocks of five trials each for analysis.

Phase One

The 2 x 2 x 4 analysis of variance (ANOVA) for phase one data indicated that the between subjects factor of model status was significant, $F(1,68)=10.73$, $p < .01$, Inspection of the mean scores (Table 2) indicated that subjects viewing a high status model ($\bar{M} = 2.52$) performed significantly better than subjects viewing a low status model ($\bar{M} = 2.10$). Neither the cueing main effect, $F(1, 68)$

= 2.16, $p < .15$ nor the model by cueing interaction, $F(1, 68) < 1$ attained significance.

Insert Table 2 about here

The within-subject factor in the present experiment involved a repeated measures factor. However, "when repeated measures are used, the assumptions of equality of within-cell population variances and the equality of correlations between repeated measures is questionable," (Kirk, 1968, p.287). To overcome this problem, it was necessary to apply a conservative F -test to the within-subject factors to avoid a positive biasing of the usual F -test. Such a test reduced the degrees of freedom and thus made rejection of the null hypothesis more difficult. The trial blocks effect was inspected applying a conservative- F with 1 and 68 degrees of freedom and retained significance $F(1,68)=21.15$, $p < .01$. A Tukey post hoc test indicated that subjects performed better on Trial Blocks 2 ($M=2.27$), 3 ($M=2.41$), and 4 ($M=2.58$) than on Trial Block 1 ($M=1.99$, ($p < .01$). In addition, performance was significantly better on Block 4 than on Block 2 ($p < .01$). This data indicated that subjects improved their performance over trials in phase one.

To compare the performance of subjects in the above four groups to the No Dem control group, all possible pairwise comparisons were made using Dunn's multiple comparison procedures (Kirk, 1968, p.

79). Results of the analysis indicated that only the Pre High subjects performed at a significantly higher level than the No Dem control. No other conditions were significantly different from each other.

Phase Two

The means and standard deviations for all phase two groups are presented in Table 3. Results of the 2 x 2 x 4 (Model Status x Cueing x Trial Blocks) ANOVA indicated that none of the between subjects factors attained significance indicating no performance effects of model status or cueing. The trial blocks main effect was significant when the conservative F -test was applied, $F(1,68)=6.23$, $p < .05$. Post hoc analysis of this main effect indicated that subjects performed significantly better on Block 8 than on Blocks 5 or 7. The Dunn's comparison procedure between the factorial groups and the No Dem group indicated no significant differences.

Insert Table 3 about here

Manipulation Checks

The questionnaire data was inspected by calculating the percentage of subjects in each group who selected the various multiple choice answers provided. When asked on a five item multiple choice scale who had demonstrated the task, subjects in the

Pre High group were most accurate (94%) whereas Pre Low (67%), Post High (61%), and Post Low (39%) were considerably less accurate in their perceptions. An open-ended question asked if subject's could recall the demonstrator's name. The percentage of subjects in each group who were correct indicated that subjects in the high status conditions were more accurate than in the low status conditions (High = 13.89%, Low = 5.56%). To determine if the model had any long lasting status influence, subjects were asked how much they would like to meet this person. If the high status manipulation was effective, then subjects under High status model conditions should probably have a greater desire to meet the model. Data support this contention since subjects had more desire to meet a High (47.2% indicated most extreme positive desire) as opposed to Low status model (22.2% indicated most extreme positive desire). The incentive offered seemed effective in the present investigation. Subjects in all groups indicated the prize was very attractive, including the No Dem control group who were not told about the incentive until after their performance trials.

Discussion

The status main effect in phase one supported the prediction that subjects perform significantly better after observing a High as compared to Low status model. The influence of model characteristics did not seem to be primarily dependent on

attentional sub-processes as evidenced by the lack of a significant cueing effect or model by cueing interaction.

The significant model status main effect is in line with previous findings reported by Landers and Landers (1973) for skilled demonstrations. During initial trials subjects performed significantly better after observing a High as opposed to Low status model. In the Landers and Landers study, the status manipulation was probably stronger than in the present study. A live teacher model who had future control over the subjects in the regular class situation served as the High status model whereas a fellow student served as the Low status model. These models were known to the subjects and were fairly well established in both their present and future roles. In the present experiment, the model had no previous history of personal interaction with the observers, and the only contact with subjects was made through films and tape recorded introductions. The findings that such subtle manipulations can at least temporarily affect performance is rather dramatic and in line with the potency of model manipulations from previous research (e.g., Yussen & Levy, 1975). Although Pre-cued subjects ($M=2.41$) performed slightly better than Post-cued ($M=2.22$) subjects, the lack of significant cueing or cueing by status effects suggested that attention was not primarily responsible for obtained performance differences.

One possible explanation for the lack of a cueing effect may be that attentional differences were inferred from performance outcome

scores only and were therefore only indirectly assessed. A recent experiment by Feltz (1982) measured both performance outcome scores and form scores hypothesizing that form scores would be reflective of strategy and would be a better indicant of modeling effects. Results indicated that of the five form components assessed by judges ratings, the variable of climbing quickly was the most important. Future research accurately measuring this quickness component may be more sensitive to the cueing manipulation employed in the present study.

A recent paper by Scully and Newell (1985) also emphasizes the importance of assessing not only outcome scores but the kinematic components of movements so that coordination and control of the movement patterns can be assessed. They emphasize that the outcome or end result may be achieved very quickly but the relative body motions may be incorrect.

Converging operations using different strategies of experimentation are needed before definitive conclusions can be made concerning the connection between model status and attentional processes. By employing a secondary task technique or probe reaction time measures, it may be possible to more directly assess the relationship between attention and various social variables. In more realistic settings, employing live models who have more clearly established and longer lasting relationships with observers, it may indeed be true that model characteristics influence observer attention and subsequent degree of observational learning.

A primary consideration in the present experiment was to determine if model characteristics affected actual amount learned or merely performance. In other words, are the effects rather permanent or are they rather transient and short-lived? This learning-performance distinction is an important one within Bandura's framework and one that is oftentimes overlooked in the motor performance literature. The findings from phase two were directed at this question and were rather clear-cut. Subjects continued to improve their performance over trials as evidenced by the significant trial blocks main effect. However, there were no differences between any of the groups in phase two indicating that all subjects, regardless of the treatment received during phase one, were performing at a similar level. Although model status did affect initial performance, the effects appeared to be transient and were not in evidence once subjects were given an incentive to perform at an optimal level. In Bandura's terms, it would appear that model characteristics affected performance, but not actual amount learned. These findings are contradictory to those reported by Grusec and Mischel (1966) when model characteristics were varied. In their experiment, nursery school subjects had the opportunity to actively and personally interact with either a model who was both highly rewarding and had high future control or with a model who was not rewarding and who had little future control over the subjects. When incentives were offered to accurately recall modeled behavior,

subjects in the high reward-high control condition remembered significantly more acts than subjects in the low reward-low control condition leading to the conclusion that model characteristics affect learning rather than merely performance.

A number of differences between the Grusec and Mischel and the present experiment can perhaps explain this discrepancy. Subjects in the Grusec experiment were nursery school age as opposed to sixth through eight graders and those younger subjects may have been easier to impress with various model manipulations. Also, the present experiment required execution of a difficult motor task. Insufficiently refined motor reproduction processes may have been accountable for the lack of initially enhanced performance on the Bachman ladder. Since subjects in the Grusec experiment were not actually required to reproduce modeled behavior, motor reproduction would not seem to be a factor in that experiment. Finally, as mentioned previously, live and realistic models may have a more dramatic and lasting effect on subject's behavior than filmed models. From an informational standpoint, the necessary cues required for efficient imitation may be extracted just as efficiently from a filmed as opposed to live model. To maximize social manipulations, filmed sequences may not be sufficient.

The finding that No Dem subjects performed fairly well in both phases of the experiment is interesting considering that subjects in this group consistently rated the task as being very difficult when

compared to the responses of other subjects. In phase one only Pre High subjects performed significantly better than No Dem subjects, suggesting that the modeling effects were rather weak. It seems from this data that model characteristics need to be optimized before performance differences occur over simple trial and error learning at least for the gross motor skill employed in the present investigation. It is suggested that tasks used in future investigations be extremely sensitive to modeling effects or that more than outcome scores be assessed. Also, since No Dem subjects had seen no model presentations, they did not have any standard of performance against which to compare their performance. For these subjects, any improvement over trials may have been self-reinforcing leading to continued motivation and performance enhancement.

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Table 1

Sequence of Events for Experimental Subjects
in High Status Conditions

PRE HIGH

Hi Status Model Performs Stunt in Uniform	Still Slide of Model With Verbal Introduction	Task Instructions	Filmed Task Demonstration
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POST HIGH

Task Instructions	Filmed Task Demonstration	Hi Status Model Performs Stunt in Uniform	Still Slide of Model With Verbal Introduction
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Table 2

Means and Standard Deviations for all GroupsPhase I

Model Status		High		Low		NO DEM
Cueing Blocks		PRE	POST	PRE	POST	
1	M	2.43	2.01	1.88	1.66	1.59
	<u>SD</u>	.60	.50	.53	.34	.40
2	M	2.44	2.38	2.21	2.04	2.03
	<u>SD</u>	.71	.76	.78	.62	.76
3	M	2.84	2.49	2.15	2.13	2.17
	<u>SD</u>	.94	.86	.40	.61	.66
4	M	2.82	2.77	2.47	2.26	2.36
	<u>SD</u>	.81	.68	.66	.74	.71
MEANS FOR GROUPS		2.64	2.41	2.18	2.02	2.04

Table 3

Means and Standard Deviations for all Groups:Phase 2

Model Status:		HIGH		LOW		NO INCENTIVES NO DEMONSTRATION
Cueing Blocks		PRE	POST	PRE	POST	
5	M	2.94	2.73	2.69	2.61	2.52
	<u>SD</u>	.73	.78	.92	.78	.78
6	M	3.11	2.77	2.92	2.54	2.80
	<u>SD</u>	.71	.71	.92	.52	.62
7	M	2.80	2.91	2.69	2.60	2.86
	<u>SD</u>	.65	.58	.79	.68	.59
8	M	2.94	3.18	3.20	2.76	3.18
	<u>SD</u>	.94	.71	1.17	.67	.84
MEANS FOR GROUPS		2.95	2.90	2.80	2.63	2.84