Translating Cognition Into Action: The Role of Visual Guidance in Observational Learning

Wayne R. Carroll
University of Arizona

Albert Bandura
Stanford University

ABSTRACT. This experiment examined the role of two forms of visual guidance in facilitating the translation of cognitive representations into action. Subjects matched a modeled action pattern either concurrently with the model or after the modeled display. They then either did or did not visually monitor their actions during tests of production accuracy in the model's absence. Acquisition of the cognitive representation was assessed periodically. Concurrent matching of modeled actions or visual monitoring of productions both increased the level of observational learning. The more accurate the cognitive representation, the more skilled were subsequent reproductions of the modeled actions. After acquiring proficiency in converting cognition to action, subjects maintained their level of performance accuracy even though modeled and visual-monitoring guidance were withdrawn. These results are in accordance with the theory that cognitive representation mediates response production and that corrective adjustments through visual guidance aid in the translation of conception into action.

ACCORDING TO THE SOCIAL cognitive theory of observational learning (Bandura, 1986), information conveyed by modeled performances is extracted through selective attention to critical features and transformed into a cognitive representation of the actions by symbolic coding and cognitive rehearsal. The cognitive representation guides response production and provides a standard against which performance feedback is compared for corrective adjustments.

In addition to attentional and retention processes that determine the acquisition of cognitive representations, a conception-matching pro-

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Requests for reprints should be sent to Wayne R. Carroll, Department of Psychology, University of Arizona, Tucson, Arizona 85721.
cess governs the translation of cognitive representations into action. If the critical features of the component responses comprising the modeled action pattern are readily represented and easily producible, accurate representational guidance of response production can be achieved with little in the way of performance and informative feedback (Bandura & Jeffery, 1973; Gerst, 1971). However, in modeled activities comprising intricate component responses, difficulties arise in detecting and encoding their critical features. As a result, initial performances are likely to be flawed (Martens, Burwitz, & Zuckerman, 1976). It is also possible that some features of action patterns are too fine-grained to represent cognitively (Adams, 1984). A recent study of observational learning, however, shows that learners were able to encode and symbolically represent even the timing requirements of modeled rapid movements (Adams, 1986).

Monitored performance provides the vehicle for converting representations to skilled actions. Production of modeled actions will be flawed if feedback accompanying performance is insufficient to permit ready detection and correction of mismatches between conception and action. The transformational production mechanism has been addressed in a series of studies on observational learning of an action pattern that normally lies outside the visual field (Carroll & Bandura, 1982, 1985). Concurrent visual monitoring of performance facilitates reproduction of a modeled action pattern, but not until an adequate cognitive representation of it has been formed. After people have translated accurate representation into corresponding behavior by closely monitored performances, they execute them skillfully without requiring modeling guides or ongoing feedback.

The present experiment was primarily designed to clarify further the role of visual guidance in the action production process. The basic conception-matching process by which cognition is converted to action can be aided by two forms of visual guidance. The first involves visual coordination of performance with a cognitive representation of the modeled actions. Visual monitoring aids error correction by identifying mismatches between performance feedback and one's knowledge of the modeled actions.

The second form of visual guidance for structuring behavior involves visual coordination of performance with ongoing modeled actions. This type of guidance is not solely an external matching process. To match a novel intricate activity as it is being rapidly modeled strains attentional and coordinative capabilities by requiring execution of matching actions at the same time they are being modeled. Having a representation of the action parameters can greatly aid the matching process through anticipatory guidance of attention and action.

Both forms of visual guidance serve to reduce the discrepancy between cognitive representation and performance of modeled actions by aiding in error detection and correction and, thereby, decreasing performance errors. Similarly, the literature on the role of response guidance in skill development also suggests that a variety of proce-
dures that minimize performance errors can facilitate learning of motor
tasks (e.g., Holding, 1965; Singer, 1977; Welford, 1976). However, the
relationship between guidance procedures and cognitive representa-
tion of actions has received little attention.

The present study analyzed the contribution of the preceding two
forms of visual guidance to the conception-matching process of ob-
servational learning. Subjects observed a model perform a novel ac-
tion pattern that would normally lie outside their field of vision. They
then attempted to match the action pattern either by performing con-
currently with the model or by performing separately after completion
of the modeled display. Within each of these conditions, subjects then
either did or did not visually monitor their actions during tests of their
ability to reproduce from memory what had been modeled. At selected
points in the series, the accuracy of subjects’ cognitive representation
of the modeled activity was measured. In a final phase of the experi-
ment, all subjects were tested for reproduction accuracy of the mod-
eled actions without the model being present and without being able
to visually monitor their actions.

Extensive pilot research revealed that without some conception of
the action pattern subjects have great difficulty in concurrently match-
ing the modeled behaviors as they are being displayed. Other re-
search has similarly shown that previewing a tracking pattern before
physically tracking it improves performance accuracy (Poulton, 1957;
Pew, 1974). Physical tracking has also been found to require more
attentional and processing resources than observation of tracking
(Klein & Posner, 1974). Therefore, subjects in the concurrent matching
condition as well as those in the separate matching condition first ob-
served the modeled actions before attempting to perform them.

It was predicted that both visual coordination of performance with
modeled actions and visual monitoring of actions during reproduction
tests would facilitate skilled reproduction from memory relative to the
control condition in which these factors were absent. It was also pre-
dicted that the facilitative effect of both forms of visual guidance would
increase as the accuracy of the cognitive representation increased.

There was no a priori basis for predicting whether behavior can be
structured better by visual monitoring of one’s reproductions or by
concurrently matching the modeled actions. It might be reasoned that
the condition providing both forms of visual coordination should pro-
duce the highest level of observational learning. However, the dual
sources of guidance would not yield added benefits if they provided
redundant information, or if the task of matching the model and sub-
sequently monitoring one’s actions exceeded information-processing
capacities (Broadbent, 1958).

Finally, it was predicted that after subjects had acquired an accurate
cognitive representation and routinized its translation into action,
skilled execution would be largely regulated and maintained by lower
control systems and would no longer require modeled guidance or
continual visual monitoring.
Method

Subjects

Twenty male and 20 female right-handed, paid volunteers were recruited from among undergraduate students at the University of Arizona. Subjects of each sex were randomly assigned in equal numbers to each of four conditions.

Modeling Stimuli and Apparatus

The modeled action pattern and paddle device used by subjects for response production were the same as that used in a prior experiment (Carroll & Bandura, 1982). Hence, only a brief description of these aspects of the experiment will be presented here.

Each subject watched a video monitor showing a male model performing a complex action pattern containing nine different response components, which varied in the spatial configuration and movement of the arm, wrist, and paddle. The first response component or starting position of the modeled action pattern was for 5 s. The eight subsequent response components were then each modeled for 2 s, with a 1.5-s transitional movement between the component actions. The complete action pattern took 33 s to execute. This complex action pattern was constructed so as to encompass common aspects of intricate activities. It required both correct patterning and temporal sequencing of actions, some of which were readily codable while others contained features that were highly subtle.

The modeled display presented only the extreme right portion of the body, as videotaped from behind the model, so that observers would not have to transform the modeled actions. A 19-in. (48.26 cm) video monitor was used to play back the action pattern. The camera angles for recording the model's and subjects' performances were kept approximately equal, so that the visual stimuli resulting from the model's performance would closely approximate those that subjects, themselves, would receive when attempting to reproduce the demonstration. Previous research has shown that a marked discrepancy between these camera angles tends to retard observational learning of intricate activities (Roshal, 1961) and avoidance responses (Greenwald & Albert, 1968).

A second videocassette recorder was used to record subjects' reproductions of the modeled action pattern. A manual switching device connected to the two videocassette recorders allowed subjects in the visual monitoring conditions to observe their performances on the video monitor, whereas those not scheduled to observe their performances saw a neutral gray, imageless raster on the monitor. Connected to the second videocassette recorder was a smaller, 12-in. (30.48 cm) monitor which was used by the operator to observe subjects' performances when no image appeared in the larger monitor.
Procedure

Subjects sat before the large video monitor. The angle on the video camera, located behind them, was adjusted so as to make visual feedback from each subject’s performance similar to visual feedback from the modeled action pattern.

Subjects were informed by a male experimenter that the study dealt with the learning of movement patterns. They were told to put on a pair of plastic safety goggles, which were painted black and which had their lenses removed. Although subjects reported being unable to view their movements, which were performed to the right side and back of the head, they wore the goggles to further insure the unobservability of the action pattern. Subjects were instructed to watch the video monitor at all times.

After demonstrating the correct grip for holding the paddle handle, the experimenter moved the subject’s arm to correspond to the correct starting position twice. Subjects then twice practiced the correct grip and the designated starting position. They were instructed to attend closely to the position of the model’s arm, wrist, and paddle in order to reproduce the action pattern accurately. They were also told to report when they had completed their attempt to reproduce the modeled action pattern.

Subjects in the concurrent matching conditions first observed the modeled action pattern, followed by a 26-s unfilled retention interval. Then they concurrently performed the modeled actions as they watched them being produced. Subsequently, they were tested for their ability to reproduce from memory the modeled actions.

Subjects in the separate matching condition first observed the modeled action pattern, then performed it from memory, then observed the modeled action pattern again, and subsequently were tested for their ability to reproduce the modeled actions. In all experimental conditions performances preceding each reproduction test occurred without visual monitoring.

The above sequences of phases equated all experimental conditions for number of matching performances and for number of modeled presentations, while keeping total time constant. An unfilled retention interval of 26 s was chosen because prior research (Carroll & Bandura, 1985) found that this was the mean time taken by subjects to execute the modeled action pattern.

Half of the subjects within each of the above conditions were able to see their actions on the video monitor during the tests for reproduction accuracy. The remaining half were not provided with the opportunity to visually monitor their actions.

All subjects repeated the sequence of phases described above four times. In addition, they were tested for reproduction accuracy on a final set of two trials without the aid of prior performance with the model or visual monitoring. Thus, all subjects were tested a total of six times for their ability to reproduce from memory the modeled action pattern.
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After the second, fourth, and sixth test trials, the accuracy of the cognitive representation of modeled actions was assessed by a recognition test of component responses and a pictorial-arrangement test of knowledge of the correct sequence of component responses.

Cognitive Representation

In the recognition test, subjects were presented photographs of the nine response components of the action pattern along with photographs of three highly-similar distractors for each component. The response components and distractors were photographed directly from the video monitor to ensure equivalence of the former to the recorded modeled pattern. Each component and its distractors were mounted on a separate page according to a predetermined random sequence, with the restriction that no two components could occur on successive pages in the same sequence as displayed in the modeled action pattern. The spatial arrangement of components and distractors on each page was also randomly determined. Each time subjects were tested for recognition memory they were presented different random orders of components and their accompanying distractors. They recorded their choice of correct components by writing the alphabetic letter printed next to each photograph. Ten s were allowed for each of these choices. The accuracy of cognitive representation was scored by awarding one point for each correct choice. The maximum score was 9.

In the pictorial-arrangement test, which immediately followed the test for recognition, subjects were shown photographs of the nine response components, depicted in a scrambled order. They were instructed to arrange the photographs from left to right in the order which accurately reflected the sequence of component responses exhibited by the model. The scrambled orders, which differed for each of the three presentations of the photographs, were randomly selected, with the restriction that no two components could occur in the same order as depicted in the demonstration. Subjects were allowed a maximum of two minutes to complete this task. The accuracy of cognitive representation was scored by awarding one point for any two response components correctly sequenced. The maximum score was 8.

Following the tests for cognitive representation after the fourth reproduction test trial, all subjects were told they would no longer see the modeled action pattern before being tested for reproduction accuracy. Subjects who had engaged in concurrent matching of the demonstration and/or visually monitored their reproductions were informed that these sources of guidance would no longer be available. Thus, the final block of two reproduction test trials occurred consecutively without either source of visual guidance.

Experimental Design

The effects of model-matching lag (concurrent or separate match-
ing) and monitoring of reproductions (presence or absence) were analyzed by a 2 × 2 mixed-design ANOVA; reproduction blocks (three blocks of two test trials each) constituted the within-subjects factor. Prior to performing an ANOVA on each of the dependent variables, a Multivariate Analysis of Variance (MANOVA) was performed as an omnibus test of significance.

Scoring of Reproduction Accuracy

Each response component and preceding transition movement were scored for reproduction accuracy. These segments were played back and viewed separately by freezing the frame or frames at which subjects completed the action component. Subjects were awarded two points for a perfect match to the modeled component in form and sequence. One point was awarded if the reproduction contained a minor, but discernible, error in wrist, arm, or paddle position, on component or transition movement, or if the component was correct but produced out of sequence. Subjects received no points if their component reproduction differed markedly from the modeled pattern in one or more features. The more errors subjects made in form and sequence the lower was their reproduction score. The maximum score possible was 18 points for each of the six reproduction attempts.

Accuracy of matching modeled actions was scored in precisely the same way as it was on reproduction test trials.

Reproductions and matching performances of a sample of pilot subjects (n = 20) were independently rated by two judges to ensure proficiency in using the scoring criteria. To increase interscorer reliability, photographs of each response component were displayed while subjects' reproductions and matching performances were being scored. These same judges then independently rated the performances of all the subjects in the main experiment. The judges had no knowledge of the hypotheses or the conditions to which subjects had been assigned. The reliability coefficients computed for each of the three blocks of reproductions were $r = .91; r = .94; r = .92$, respectively. Overall reliability, based on the Fisher $r$ to $z'$ transformation, was $r = .92$. Reliability coefficients for the two blocks of matching performances were $r = .90$ and $r = .95$, respectively. The overall reliability was $r = .93$.

Results

Data for males and females were pooled because the gender factor produced no significant differences on any of the three response measures ($Fs < 1$).

Before reporting the results on the effects of the treatment conditions on reproduction accuracy, it is important to verify that subjects were, in fact, able to achieve simultaneous matching of the modeled actions. Otherwise, concurrent matching would have been an experimental condition in name only. Those who matched the modeled actions con-
currently did so with high accuracy even on the first block of trials (83.3% of the maximum score of 36) and continued to match well in the second block of trials (84.1%). Dunn's multiple comparison procedure (Kirk, 1982) indicates that the level of accuracy did not differ significantly either across trial blocks or between concurrent matchers who could or could not observe their reproductions during test trials ($p > .05$).

The multivariate analysis (MANOVA) yielded significant between-subjects main effects for model-matching lag, $F(3, 34) = 12.57$, $p < .001$, for monitoring, $F(3, 34) = 8.29$, $p < .001$, and for the interaction between model-matching lag and monitoring, $F(3, 34) = 7.45$, $p < .001$. Significant within-subjects effects included a main effect for reproduction blocks, $F(6, 31) = 70.99$, $p < .001$, but neither of the two-factor interactions were significant. The triple interaction between reproduction blocks, model-matching lag, and monitoring, however, achieved significance, $F(6, 31) = 2.45$, $p < .05$. Univariate ANOVAs were then performed on each of the dependent variables.

Reproduction Accuracy

Figure 1 presents percentage accuracy of reproduction scores as a function of model-matching lag and monitoring across blocks of reproduction attempts. Results of analysis of variance revealed significant main effects for model-matching lag, $F(1, 36) = 20.15$, $p < .001$, and for monitoring, $F(1, 36) = 8.96$, $p < .005$. A significant interaction between model-matching lag and monitoring, $F(1, 36) = 17.70$, $p < .001$, was also found. Analysis of the simple effects of this interaction indicated that concurrent matching was superior to separate matching for subjects who could not observe their reproductions, $F(1, 36) = 18.90$, $p < .001$, but not for those who could monitor the adequacy of their reproductions ($F < 1$).

The within-subjects portion of the ANOVA indicated that reproduction accuracy increased significantly over blocks, $F(2, 72) = 110.70$, $p < .001$, which is due primarily to the substantial improvement in the second block of productions. The interactions between blocks and model-matching lag and between blocks and monitoring did not approach significance. However, the triple interaction between blocks, model-matching lag, and monitoring was significant, $F(2, 72) = 5.05$, $p < .01$. Analysis of the simple effects indicated that the difference between concurrent and separate matching for those subjects tested without visual monitoring was significant on the first, $F(1, 108) = 11.13$, $p < .001$, second, $F(1, 108) = 30.93$, $p < .001$, and third, $F(1, 108) = 35.96$, $p < .001$, blocks of reproduction. In contrast, the difference between concurrent and separate matching failed to approach significance on any of the three blocks for those who reproduced the modeled actions with the benefit of visual monitoring. The triple interaction appears to be caused primarily by the relatively
Figure 1. Percentage reproduction accuracy as a function of model-matching lag and monitoring of blocks of reproduction test trials. (T = test trial blocks; W = test trial block in which modeling and visual monitoring of reproductions are completely withdrawn.)

A steeper increase in reproduction accuracy by conditions which were provided concurrent matching and/or visual monitoring as compared to the one that had neither source of guidance.

Dunn's multiple comparison procedure indicates that on each of the three reproduction blocks the three experimental conditions that had the benefit of concurrent matching and/or visual monitoring did not differ from each other, but each was significantly superior to the condition deprived of both of these sources of visual guidance (p < .01). Within-subject comparisons indicate that all experimental conditions increased their accuracy of reproducing the modeled actions between Block 1 and Block 2 (p < .01). As Figure 1 shows, subjects in all conditions maintained their level of reproduction accuracy on the last block, even though all the sources of external guidance were withdrawn.

Because it was predicted that development of the cognitive representation is necessary before subjects can profit from either concurrent matching or visual monitoring, subjects’ performance on the first trial of Block 1 was analyzed by a one-way ANOVA. The results re-
revealed no differences in reproduction accuracy among the experimental conditions, \( F(3, 36) = 1.30 \). It was not until the second reproduction attempt of Block 1, by which time subjects had four exposures to the modeled actions, that differences among conditions emerged, \( F(3, 36) = 6.24, p < .01 \). The nature of the differences are the same as those reported above for the blocks of reproductions.

The \( t \) test for correlated means was used to determine whether the highly accurate execution of the modeled actions during concurrent matching carried over to performance during reproduction tests. On Block 1, concurrent matching was associated with decreased accuracy on reproduction trials regardless of whether subjects could monitor their reproductions, \( t(9) = 6.33, p < .001 \), or not, \( t(9) = 6.97, p < .001 \). On Block 2, neither of the concurrent matching conditions showed a decrement \((p > .10)\). In contrast, on Block 1, the separate matching condition provided with visual monitoring on reproduction trials performed better on these trials than on matching trials, \( t(9) = 3.33, p < .01 \). However, there was no difference on Block 2, \( t(9) = 2.18, p > .05 \). Because the separate matching condition not provided with visual monitoring on reproduction trials achieved a low level of accuracy on matching trials, it is not surprising that performance accuracy on reproduction and matching trials did not differ on either block \((t < 1)\).

Cognitive Representation

Subjects showed an increasing ability to distinguish correct components from incorrect ones, \( F(2, 72) = 147.83, p < .001 \), in successive tests of component recognition. The mean scores at each of the three tests were 4.72, 7.52, and 7.75, respectively. Subjects' performance on the pictorial-arrangement test mirrored that found for recognition, \( F(2, 72) = 128.58, p < .001 \). The mean scores at each of the three tests were, in order, 3.38, 6.20, and 6.70. Neither model-matching lag, monitoring, nor any of the interactions affected rate of acquisition of the cognitive representation.

Relationship Between Cognitive Representation and Reproduction Accuracy

In order to determine the relationship between conception and action, level of cognitive representation was correlated with the accuracy of reproducing the action pattern. Because the correlations did not differ significantly across experimental conditions, they were averaged using Fisher's \( r \) to \( z' \) transformation. Increases in component recognition were associated with increases in reproduction accuracy, \( r = .34, p < .05 \). Similarly, the better the representation of sequential ordering of the components, the higher was the reproduction accuracy, \( r = .64, p < .001 \). The two measures of representation correlated positively, but nonsignificantly, \( r = .14 \).
Translating Cognition Into Action

The relationship between representation and reproduction was further analyzed in terms of the temporal ordering of these factors by correlating the accuracy of the cognitive representation with accuracy of performance on the first trial of each subsequent block of reproductions. For all experimental conditions, as knowledge of component sequencing increased on the first test so did the accuracy of the subsequent reproduction, $r = .48, p < .001$. Similarly, component sequencing scores on the second test were significantly correlated with scores on the subsequent reproduction trial, $r = .36, p < .025$. With regard to component recognition, scores on the first test were not significantly associated with the succeeding reproduction scores, $r = .14$, whereas the correlation between recognition and subsequent reproduction did achieve significance on the second test, $r = .32, p < .05$.

Discussion

The results of the present experiment reveal that observational learning is greatly facilitated by opportunities to structure the appropriate action pattern by visually coordinating one's performances with either the modeled actions or a retained conception of them. Neither source of visual guidance affected the accuracy of initial reproductions of the modeled actions.

Concurrent matching produced almost perfect performance of the modeled actions from the outset. However, subjects displayed a substantial loss in accuracy when they first tried to reproduce the modeled actions from memory before they had a clear representation of them. After acquiring a more precise cognitive representation, subjects could reproduce the modeled actions just as accurately from memory of them as from matching the ongoing modeled performances. These patterns of results suggest that production proficiency was mediated by representational acquisition rather than being directly forged by accurate performances cued by modeling stimuli.

Correlational analyses showing that the better the cognitive representation the more accurate were the subsequent reproductions also lend support for representational guidance. Similar relationships between representation and action were found in previous studies using the same task (Carroll & Bandura, 1982, 1985). Findings of other studies have shown that observational learning is enhanced by cognitive representation which is manipulated independently of any performance opportunities by providing subjects with effective coding strategies (Bandura & Jeffery, 1973; Bandura, Jeffery, & Bachica, 1974). Subjects who had cognitively represented complex modeled actions during exposure to the model subsequently executed the action pattern with considerable accuracy, whereas those who failed to develop an accurate cognitive representation could not produce the behavior. Such findings increase confidence that a causal relationship underlies the correlation between cognition and action.
The finding in our study that the cognitive representation increased in accuracy over trials but was unaffected by either visual monitoring or concurrent matching suggests that the cognitive representation develops primarily as a function of the number of exposures to the modeled information. It also suggests that the superiority of the visual guidance conditions lies mainly in their facilitating the translation of cognition into action. More specifically, while performing with the modeled actions, subjects in the concurrent matching condition use the visual information provided by the demonstration to guide their matching performances. Discrepancies between their performances and modeled information are reduced by corrective adjustments in their actions. A similar translation process operates under separate matching except that the corrective adjustments in action must rely on detection of mismatches with a retained representation of the modeled pattern. Subjects in this condition are aided in the process of error detection and correction by the provision of visual monitoring during reproduction tests. In fact, they achieved a level of observational learning comparable to that of subjects who had the model to guide their matching performances. Subjects, however, who engaged in separate matching and could not observe their actions during reproduction tests achieved a low level of observational learning.

With improved cognitive representation and repeated experience in translating conception to action, subjects routinize the activity to the point where they are no longer dependent on visual monitoring or modeled guidance. Although subjects who could neither coordinate their actions to those of the model nor see what they were doing also have experience in translating cognition to action, they must rely on impoverished feedback accompanying their reproductions to detect and reduce discrepancies between cognitive representation and action.

In contrast to the facilitative effect of visual monitoring under separate matching, reproduction accuracy under concurrent matching was not increased by visual monitoring. As noted earlier, visual monitoring may not have had a facilitative effect because it provides redundant information or because it increases competing attentional demands that could produce some interference. The latter is suggested by the finding that subjects in the concurrent matching conditions who reproduced modeled actions without visual monitoring became increasingly more proficient compared to their counterparts who visually monitored their reproductions. The difference between concurrent matching conditions might possibly have increased even further with additional experience in converting representational guidance to action.

As noted earlier, the modeled activity was designed so as to increase the generality of the findings to the observational learning and production of complex action patterns. This multifaceted action pattern comprised an intricate set of components requiring both differential patterning and temporal sequencing of actions. Some of the movements were readily codable whereas others involved highly subtle
shifts in form, transition, and position that are more difficult to discern. Having clarified some aspects of visual monitoring systems in observational learning, the research needs to be extended to articulate further the way in which the different forms of visual guidance operate in the transformational mechanism. For this purpose, a variety of action parameters—spatial patterning, temporal sequencing, codability, amplitude, speed—need to be varied singly and in combination.

The present study contributes to the growing body of evidence indicating that cognition plays an important role in motor learning (e.g., Adams, 1984, 1986; Bandura, 1986; Marteniuk, 1976; Newell, 1978). It also highlights the contribution of visually-guided performance to the process of matching action to cognitive representation. More generally, observational learning provides an excellent paradigm for investigating the relationship between cognition and action (Adams, 1984). Because observers acquire primarily symbolic representation for subsequent response production, assessment of what has been learned can be made independently of performance by means of verbal construction tests, recognition tests, pictorial-construction tests, and other methods. Virtually all learning phenomena resulting from direct experience can occur vicariously by observing the behavior of others and its consequences (Bandura, 1986). Hence, the cognitive component of traditional motor learning variables, such as knowledge of results, can also be investigated within the observational learning paradigm by having subjects view unskilled models who receive informative response feedback (Adams, 1986).

REFERENCES


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