the interocular group failed to show a transfer of practice effect, central explanations would have been strongly limited in their ability to handle M-L data.

The test-practice difference obtained had nothing to do with differences in eyes tested, since it was equal in magnitude for the intraocular group who were tested with the same eye. Rather, it reflects a large drop in magnitude of the illusion between the first and second blocks and a minimal change between third and fourth blocks, as indicated by the Test-Practice by Early-Late interaction. The lack of group differences further suggests that the test-practice variable was in fact part of the same temporal dimension as was the early-late variable and both reflect a general learning trend.

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Correction procedures in observational learning*

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Informative feedback to the performer was varied in a study of observational learning. The task required Ss to learn to discriminate the correct member of each of a number of groups of three line-tilt designs. One group was always shown the correct design in the event of an error (SC), another was allowed to continue responding until the correct design was found (DC), and the third group received only outcome correction (OC) on error choices. Test trial data indicated that OC generally produced poorer performance than SC or DC, but there was no difference for the performer vs the observer. This suggests the comparability of processes in observation and performance, at least in terms of differences induced by correction procedures.

A great deal of interest surrounds the question of whether or not people learn as well by watching another person perform as they do by actually performing themselves. This question is relevant not only to the applied problem of training but also to the issue of modeling and vicarious reinforcement (e.g., Flanders, 1968) as well as observational learning (e.g., Rosenbaum & Arenson, 1968). In the case of modeling, the interest is most specifically in the acquisition of imitative responses by one person instead of learning by two persons of an E-defined set of responses, as in observational learning, although the two areas can be divided only arbitrarily.

The present study concerns the effect of various informative feedback procedures on learning under performance and observation conditions. Our initial interest in this problem was largely methodological and derived from the rather ambiguous results in our laboratory with regard to the relative retention of observers and performers. It seems that most studies in this area have used a specific correction procedure, with S being immediately shown the correct response in the event of an error. Other methods might include mere outcome correction, with S not being shown the specific correct response after an error, as well as a correction discovery procedure whereby the S continues responding until he finds the correct response each time. The question of interest was whether or not observation was more effective under one arrangement than under the others.

Although this is essentially a methodological investigation, there are at least two grounds for believing that the feedback procedure might affect observational learning differently than actual performance learning. First of all, there is the issue of proprioceptive feedback (e.g., Adams, 1968). To the extent that some of S's feedback is proprioceptive, the possible correction techniques would provide such feedback differentially, as would observation as opposed to performance. Furthermore, it is possible to distinguish between an S's memory for a response and his memory for the outcome of that response in a given situation (e.g., Buchwald, 1969). It seems possible that these two memories might be differentially involved when a person is performing as opposed to when he is observing someone else. For example, an observing S may have preferred another response on a given occasion, so that on the subsequent repetition of the stimulus the S may be confused as to whether his preference or the performer's choice produced a given outcome, whereas the performer would experience no such conflict.

Although the preceding comments might seem more applicable to the observational learning situation, they can be applied to the modeling procedure as well. In addition, modeling adds the possibility that the type of feedback will be viewed as a manifestation of E's "good will." The purpose of the present experiment was to investigate observational learning as a function of feedback, extend its generality, and help to illuminate its differences from performance.

SUBJECTS AND DESIGN

One hundred and twenty students from introductory psychology courses participated in fulfillment of course requirements. The overall design may be summarized as a 2 by 2 by 3 factorial, with sex, performance condition (observe, perform), and feedback condition (outcome, discovery, specific) as between-S factors, with 10 Ss per cell.

APPARATUS

The Ss were run in booths equipped with a display panel and shelf desks to write on during tests. The panel in front of S had three IEE cells in a horizontal row about 4 in. apart, with response buttons directly below each cell to be used by the S to indicate his choice. Each cell displayed up to eight tilted lines (22½-deg differences) and the colors red or green when required. The cells were controlled by a Honeywell DDP-116 computer which displayed the stimulus patterns in predetermined orders, recorded the responses of the performing S, and provided response-contingent feedback according to one of the treatments described below.

STIMULUS MATERIALS

Line-tilt patterns were used as the stimuli, excluding patterns with eight lines or no lines. From the remaining combinations of lines tilted at different angles, three sets of 36 designs each were chosen. Each set was

*This research was supported in part by Research Career Award 1-K6-MH-22,023 from the National Institute of Mental Health, to the third author, and by a grant from the U.S. Office of Education, Department of Health, Education, and Welfare. The opinions expressed herein, however, do not necessarily reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred.

Table 1
Mean Number of Correct Responses Pooled Over Test Trials by Sex, Performance Condition, and Feedback Condition

	Men		Women	
Feedback	Observe	Perform	Observe	Perform
Outcome	7.41	7.16	7.15	7.50
Discovery	8.94	8.40	8.98	8.61
Specific	8.58	9.44	8.38	8.89

arranged in 12 triads, subject to the restriction that no designs of the same complexity (number of lines) were placed in the same triad. In the set as a whole, however, complexity was not consistently related to correctness. The triads in each set were then arranged in different orders for presentation on successive trials through the set, subject to the restrictions that every run through the set (trial) involved an equal number of correct responses in the left, center, and right spatial positions on the display panel and that no more than two consecutive correct designs appeared in the same spatial position. One of the sets of 12 triads thus served as the stimuli; the S's task was to learn which design in each of the 12 triads had been arbitrarily designated as correct. Each set of triads was used about equally often in each of the 12 groups.

FAMILIARIZATION

About 30 min prior to the experimental session, the Ss were given instructions and training for the task and their particular performance role. Instructions were played over an intercom in the booth from a tape recorder, describing the roles of the observer (O) and performer (P). The Ss were run as pairs but were isolated in different booths. The P chose which of the designs he wanted from each triad, and feedback was delivered contingent on the correctness of his response. The O was not allowed to choose any design during the study phases but was only shown the P's choice and its outcome, and the booths were yoked through the computer for this purpose.

The display panels were explained, then the Ss were shown a sample set of triads. The task for P was to choose the correct design in each triad. He then received one of three varieties of informative feedback, with O seeing both the choice and feedback in real time in his booth. The sample had eight triads shown for two study trials with only P responding, followed by a paper-and-pencil test for both O and P. During the joint test, the triads were shown on the display booth in both panels, with O and P checking a piece of paper for left, center, and right as their choices, and with no feedback given. Two more study trials and another test concluded familiarization. The Ss were thus acquainted with their performance role, feedback condition, and general task procedures.

EXPERIMENTAL SESSIONS

The experiment proper used the sets of 12 triads noted above. Whereas familiarization involved blocks of two study trials separated by tests, the main experimental session used blocks of three study trials before a test trial. Eight blocks of three study trials followed by a test were used.

FEEDBACK

Three different feedback conditions were used; the primary difference was in how an error response was treated. It may be noted that these differences were effective only for the study trials, with no information given on the test trials. In all cases, the yoked O saw all choices and feedback on his own panel. The responding was essentially self-paced but with a 10 sec limit per triad and a 3 sec intertriad interval.

With outcome correction (OC), S's error was simply followed by a red light superimposed on the pattern he had chosen. The next triad then appeared after 2 sec. If the S was correct, a green light was superimposed on the design for 2 sec. On an error trial, Ss in the OC group did not know which of the two remaining designs were correct.

With discovery correction (DC), the S was allowed a second choice on an error trial and a third, if necessary, to find the correct response. Thus, S could make as many as three responses to each triad but always was shown which design was correct before the next triad appeared.

A correct choice in the two conditions described above always led to a green light appearing over the design chosen. In the specific-correction (SC) condition, however, this also occurred on the error choices. That is, if S made an error, the green light simply came on over another design, the correct one. The S was, however, only allowed one response per triad. The SC and OC arrangements have been recently investigated with word triads by Mueller and Pickering (in press).

RESULTS AND DISCUSSION

The data from the paper and pencil tests were used in a 2 by 2 by 3 by 8 mixed analysis of variance, adding trials to the previously noted design as a within-S factor. Table 1 presents the group means for these data. Analysis of the number correct revealed no reliable main effects for either sex or performance ($Fs < 1$). Feedback condition was significant, with OC reliably less effective than SC or DC [$F(2,108) = 8.39$, $p < .01$] and no difference between SC and DC.

The only effects for sex or performance involved interactions with trials. Women were not as good as men early, but surpassed men on the later trials [$F(7,756) = 2.52$, $p < .05$]. Performers became superior on the later trials, although there was no difference early in learning [$F(7,756) = 2.28$, $p < .05$]. The data revealed no other significant effects or interactions, notably the Feedback by Performance interaction ($F < 1$). After 24 study trials and 8 test trials, only about 80% performance had been attained, thus apparently ruling out asymptotic performance as an explanation.

On the basis of the present data, there seems to be no reason to expect the comparability of observational and performance learning to be limited to any one of the types of feedback used in this study. While some difference might have arisen with faster presentation rates or learning to a stringent criterion, there is no suggestion of a difference with slow rates of presentation, and, in so far as correction-induced processes are concerned, observational learning appears to be comparable to performance. While there seems to be no difference in observational learning as a function of information, it may be that the psychological difference would prove crucial in the modeling situation, but that is beyond the scope of the present paper.

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