Transfer of practice effects with the Müller-Lyer illusion*†

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Two groups of Ss received monocular repeated trials with a large display of the Brentano version of the Müller-Lyer illusion. Intraocular transfer of practice effects of one group was compared to interocular transfer for the other group. The finding of similar transfer performance was interpreted as supportive of the operation of central factors in producing practice effects.

Previous investigations of the Müller-Lyer (M-L) illusion have attempted to decide between central and peripheral explanations or between different types of central explanations of the illusion by comparison of different modes of stimulus presentation (Pollack, 1964; Day, 1962).

One traditional means of separating central and peripheral explanations of perceptual phenomena is to compare the magnitude of an effect under monocular viewing by testing for interocular transfer. Although interocular transfer is not in itself sufficient for acceptance of a central explanation (Day, 1958), it is a necessary condition which has not been demonstrated with the M-L illusion.

The magnitude of the M-L illusion decreases with repeated trials using a large display under free viewing conditions and monocular judgments (Day, 1962, Experiments 4 and 5; Mountjoy, 1960). The present study was designed to compare the magnitude of the practice effect under interocular vs intraocular observations.

METHOD

Male volunteers from an introductory psychology class, ages 18 to 28, were assigned nonsystematically to either an interocular (N = 14) or an intraocular (N = 14) group. None of the Ss had previous experience with the M-L illusion. One-half of each group were initially trained with the preferred eye and one-half with the nonpreferred eye.

The M-L test figure was painted on a wood stand in flat white on a flat black background. The width of all lines was .5 cm. The standard length (22.5 cm) always appeared on the left and formed a continuous straight line with the movable comparison length (adjustable from 14.5 to 27.5 cm) which appeared on a wooden slide. The visual angle subtended by the figure was approximately 33 deg. The lines forming the angles were 2.5 cm long and formed a 45-deg angle with the standard line and a 135-deg angle with the comparison line. Black dots (.32 cm in diam) were placed at the apex of each angle as reference points. The comparison line was adjusted by means of a 91.5-cm wooden dowel attached to the end of the slide. A scale, mounted on the back of the slide, provided readings accurate to within 1 mm. The center of the M-L figure was at eye level and 76.2 cm from the center of S's forehead, with S seated in a chair. The apparatus was illuminated with two rows of overhead fluorescent ceiling lights.

The S was shown an example M-L figure drawn in black ink on a white 3 x 5 in. index card. He was told that his task was to adjust the length of the movable line on a similar figure so that the two lines appeared equal in length. With the M-L test figure shielded from view, S was given six practice trials of adjusting the movable slide without making length judgments.

Each S made 36 adjustments in the following order: 4 with the test eye, 28 with the practice eye, 4 with the test eye. Two complementary schedules were used for the positioning of the comparison line prior to each adjustment. The position varied in both physical direction and magnitude in an unsystematic manner, except that no more than two successive positions were made in the same direction. The initial four and final four adjustments with each eye were made from identical positions. All adjustments were made monocularly—one eye was covered by an eye patch which applied no pressure to the eye and blocked approximately 160 deg of the front view while permitting light to enter at the periphery.

For each adjustment the M-L figure was exposed, and S was given 10 sec to adjust the variable length to subjective equality. The M-L figure was then covered with a black shield for 10 sec, during which time the adjustment reading was recorded and the new setting was made.

The only difference between the interocular and intraocular group procedure was that during the 60-sec interval allowed for shifting from use of one eye to the other, the intraocular Ss shifted the eye patch to the uncovered eye and then back to the originally covered eye. Thus, the intraocular group used the same eye throughout training, while the interocular group shifted from use of one eye to the other.

RESULTS

Observations were grouped into nine blocks of four trials, each containing two ascending and two descending adjustments. Only the first and last two blocks were analyzed, i.e., Blocks 1, 2, 8, and 9. These four blocks all were obtained using the same eye for the intraocular group and differed only in level of practice. However, for the interocular group the first and fourth blocks were obtained with the test eye and the second and third blocks with the other, the practice eye. The trial blocks will thus be labeled "test-early," "practice-early," "test-late," and "practice-late."

The mean errors of adjustment were subjected to an analysis of variance. Groups was a between-Ss variable, and test-practice and early-late were within-Ss variables. Table 1 presents the cell means.

The test-practice and early-late effects were both significant beyond the .01 level, $F(1,26) = 13.31$ and 20.09, respectively. The interaction between these two variables was significant at the .05 level, $F(1,26) = 6.15$. None of the remaining effects approached significance ($F < 1$ in all cases) and, as may be seen, differences between groups were quite small.

DISCUSSION

The data indicate that the M-L illusion does diminish with practice and that the magnitude of the diminution is the same for intraocular and interocular conditions of observation. The present results do not rule out peripheral explanations of the M-L illusion because with smaller displays and different viewing conditions, a practice effect is not exhibited and peripheral explanations are supported (Day, 1962, Experiments 1, 2, and 3; Pollack, 1964). The data merely indicate that central explanations are tenable. Had

Table 1
Mean Magnitude of Illusion (mm)

Group	Trial Block: Early Test	Early Practice	Late Practice	Late Test
Interocular	31.1	26.7	19.0	20.0
Intraocular	31.1	24.7	19.7	21.0

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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.

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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