Transfer of illusion decrement: The effects of global versus local figural variations

CLARE PORAC

University of Victoria, Victoria, British Columbia, Canada

and

STANLEY COREN

University of British Columbia, Vancouver, British Columbia, Canada

The magnitude of many visual-geometric illusions decreases with continued inspection. This illusion decrement transfers from one illusion variant to another, with the magnitude of the transfer dependent on the apparent similarity between illusion figures. We conducted three experiments with the Müller-Lyer figure to assess factors controlling the transfer of decrement. Neither awareness of stimulus differences nor changes in local elements among the transfer and decrement figures differentially affected the magnitude of the transfer effect. However, global changes that altered the relationship between elements of the stimulus resulted in variations in the degree to which decrement training transferred among the illusion variants. This result has implications for our understanding of illusion decrement as a form of perceptual learning and also for our understanding of the relative processing priority of classes of figural features found in multi-level visual forms.

There are a large number of simple line configurations that produce systematic perceptual errors in subjects who are asked to judge the size, shape, or direction of particular stimulus elements within them. These visual-geometric illusions have been described and discussed extensively by perceptual researchers (see Coren & Girgus, 1978a; Robinson, 1972). Although the stimuli producing illusory effects are simple, sometimes involving only a line or two, the mechanisms responsible for the distortions are complex. Research of the past 10 to 15 years has shown that the illusions arise from the complex interaction of many levels of visual processing, including *structural* components, involving the optical and neural properties of the eye and visual system, and cognitive-judgmental *strategy* components, which include the way in which the higher visual centers interpret, assess, and encode information (see Coren & Girgus, 1978a, 1978b; Coren & Ward, 1979; Girgus & Coren, 1973, for reviews).

The observation that, with simple inspection, the magnitude of these distortions diminishes is as interesting a phenomenon as the existence of the illusions themselves. This illusion decrement occurs for many configurations,

including the Müller-Lyer, Poggendorf, Zöllner, Wundt-Hering, and Oppel-Kundt illusions (Coren & Girgus, 1972, 1973; Coren & Hoenig, 1972). The decrease seems to operate directly on the cognitive component of the illusory distortion, perhaps through some form of perceptual learning. For instance, illusion decrement responds to traditional learning variables, such as massed versus distributed practice (Dewar, 1968), it transfers interocularly (Porac & Coren, 1977), and it accumulates over days or even weeks of practice (Girgus, Coren, Durant, & Porac, 1975; Judd, 1902).

Eye-movement information seems to form the basis of this perceptual learning. Eye movements are systematically in error when viewing illusory arrays. When scanning the underestimated component of the Müller-Lyer illusion, there is a tendency to undershoot the vertexes; when scanning the overestimated component, there is a tendency to overshoot them (Coren, 1981; Festinger, White, & Allyn, 1968). The erroneous eye movements are followed immediately by corrections to fixate the vertex. This recorrective process could provide information about the nature and extent of the illusion, which, subsequently, could be used to correct the information-processing errors that originally led to the illusion. Data indicating that illusion decrement is greatly reduced when eye movements across the illusion figure are restricted support this contention (Coren & Hoenig, 1972; Day, 1962; Festinger et al., 1968).

One of the strongest lines of evidence that illusion decrement results from a gradual recorection of the cognitive component in the formation of the illusion comes from the fact that illusion decrement transfers from one figure to

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another in a systematic manner. Coren and Girgus (1974) used a transfer-of-training procedure where a group of observers viewed the classic form of the Müller-Lyer illusion (Figure 1A) for 5 min to induce illusion decrement. They next tested to see if the decrement transferred to other variants of the illusion (B, C, D, E), all of which had been rated for their apparent similarity to the standard form (A). They reported that there was transfer to the other configurations, with the figures that had been rated most similar to the inspection figure showing the largest effects and those that were most dissimilar showing the least transfer. This finding was replicated by Porac, Coren, Girgus, and Verde (1979). Theoretically, it is significant that apparent similarity between test and practice figure is the best predictor of the transfer of illusion decrement whereas structural factors, such as common contour elements or features, are not predictive of the amount of transfer.

The transfer-of-decrement data, suggesting cognitive involvement in illusion decrement by means of perceptual learning, raises some interesting questions. For instance, how specific is the perceptual recalibration associated with illusion decrement? Which specific stimulus characteristics most influence the amount of transfer? Will a simple change in the cognitive evaluation of figural identity suffice to produce diminished transfer of illusion decrement? The original Coren and Girgus (1974) stimuli involved complex configurational changes that did not vary specific dimensions separately; therefore, these questions

cannot be answered from their data. However, a new set of studies, conceptualized in the context of contemporary work in pattern perception, can clarify some of these issues. Recent researchers in pattern recognition have argued that any configuration can be interpreted at two levels of processing, local versus global. These levels coexist in the perceptual experience, but they can be studied separately in the laboratory (Kimchi & Palmer, 1982; Navon, 1977, 1981; Pomerantz, 1983; Ward, 1982, 1983). The first level, or the local features of the figure, represent individual elements of the complete form. For example, in a large letter S, whose contours are composed of small letter Hs, each small H is considered to be a local element. A local element can change (become another small form, for example), but the overall global organization, that of a letter S, will remain constant. A local element in the standard form of the Müller-Lyer illusion would be a line segment or an angle. We could increase or decrease angle or line size, but the overall global organization of the figure would remain. The global organization of the standard form of the Müller-Lyer figure is the relationship between the line and angle segments that give it its characteristic identity. Thus, global features refer to a figural *gestalt*, whereas local features refer to component parts (Pomerantz, 1983).

The Coren and Girgus (1974) study showed that transfer of decrement in the Müller-Lyer figure varied as a function of perceived similarity. However, their study did not address the specific basis of the perceived similarity effect. For example, Figure 1B is a variant of the illusion that was rated as very similar to the standard form (Figure 1A) in their study, whereas Figure 1E is a variant rated as very dissimilar. Figure 1B contains only a simple change of a local element—the wings are separated from the shaft segment by a small space. However, the overall organization is still identifiable as the classic Müller-Lyer figure. Figure 1E varies both local and global features of the form; one of the characteristic local features (angles) is removed and the rearrangement of the other local feature, line segments, makes the figural gestalt appear to be different and not readily identifiable as the Müller-Lyer illusion. This latter figure produces little transfer of the decrement effect, suggesting that “perceived similarity” is based on an assessment of a characteristic global organization. Dramatic departures from this global organization cause the figure to be evaluated and processed in a way that differs from that used when the standard form of the illusion is processed; it is this cognitive processing difference that results in the lack of transfer to the variants rated as dissimilar to the standard form. A good analogy is what one finds when the gap in the printed letter C is closed to form an O. The gap in the C can be changed locally to any size, and the letter will be processed in a similar fashion with similar phonemic and acoustic associations attached. However, when the gap is closed, the overall organization changes and a new set of associations within a different information-processing context is activated.

Figure 1. Figure A is the basic variant of the Müller-Lyer figure used by Coren and Girgus (1974) in the decrement phase of their experiment. Figures A through E were used in their transfer testing. Figure F is the Brentano form of the illusion with wings 30° from the horizontal; G has wings 60° from the horizontal, and H is a 180° rotation of F.

This notion suggests that transfer of decrement in the Müller-Lyer illusion rests on assessments of global, rather than local, similarity and predicts that transfer will occur when local properties are varied in isolation, but will not occur when the global organization changes. The present series of experiments tested this contention by measuring the transfer effect when local versus global features of the standard Müller-Lyer form were altered separately in each transfer situation.

EXPERIMENT 1 FIGURAL IDENTITY

We designed the first experiment to examine the effect of awareness of differences in figural identity on the transfer of decrement. The practice (decrement) and transfer (pretest and posttest) Müller-Lyer figures were identical in both their local and global properties in this experiment. However, in two of the conditions they differed in color so that they could be identified clearly as separate forms. The Coren and Girgus (1974) study did not consider the effect of awareness of figural identity or difference on the transfer of decrement. If specific figural identity is encoded as part of the decrement process, then color change should affect the transfer effect because it affects the subjects' awareness that the two figures are different. However, if the decrement process encodes general rather than specific figural similarity, as predicted by the argument that global organizational feature similarity is the relevant variable in the transfer of decrement, the subjects' awareness that the figures are distinct will not affect the magnitude of the effect and transfer will be identical across all test and practice conditions.

Method

Stimuli and apparatus. We constructed two variants of the Brenano form of the illusion (Figure 1F) identical in shape and dimensions but differing in color (red vs. black). The stimuli were adjustable via a tongue-and-groove arrangement, in which the apparently shorter portion was fixed while the apparently longer portion was adjustable. The fixed portion of each figure was 80 mm in length. Each wing was 20 mm and formed a 30° angle with the horizontal shaft. All lines in the figures were 1 mm wide. The red figure had an equivalent Munsell value of 5R, 4/12 (12.5% reflectance), the black figure was N2.5 (7.1% reflectance), and the background was white (77% reflectance). The subjects viewed the stimulus from a distance of 40 cm.

Procedure and Subjects. We used the transfer of decrement paradigm of Coren and Girgus (1974) with three groups. One group experienced decrement training on the black version of the Müller-Lyer and also was pre- and posttested on the black version. This group was called the Same group. We also had two Different groups. One experienced decrement on the black version of the illusion with pre- and posttesting on the red figure; the second underwent decrement on the red variant with pre- and posttesting on the black figure.

Every subject made one pretest setting on the transfer figure in which he or she set the apparently longer segment of the figure so that it appeared to be equal in length to the apparently shorter segment. Settings were recorded to the nearest 0.5 mm from a scale affixed to the rear of the apparatus. Next, the subject was presented with the inspection figure. Following an initial setting on this figure, the subject systematically scanned the illusion array for 5 min, during

which measurements of illusion magnitude were taken at 1-min intervals. During the 1-min scanning phases, the illusion figure was positioned so that both the adjustable and the fixed segments were of equal physical length. The subject was instructed to move his or her eyes across the stimulus from angle vertex to angle vertex, and he or she was observed constantly during each scanning phase to ensure adherence to the instructions. This procedure leads to substantial decrement in the Müller-Lyer illusion (see Coren & Girgus, 1978a, for a review). The decrement portion of the experiment was followed by a posttest measurement of illusion magnitude on the transfer figure. Subjects made either all ascending (the start position of the adjustable half was clearly shorter than the length of the fixed segment) or descending settings (the start position was clearly longer than the fixed extent), and the direction of setting was counterbalanced across subjects.

Thirty-six undergraduate volunteers served as subjects. Each was assigned randomly to one of the three groups. All were prescreened for their visual abilities and were within the normal range (either with or without refractive correction), as determined by the Keystone Visual Skills battery, and all were naive as to the purpose of the experiment.

Results and Discussion

Before we measured the amount of transfer in the Same and Different figure conditions, we assessed whether decrement had occurred. Transfer of training cannot take place in the absence of a significant training decrease in illusion magnitude. In addition, the magnitude of decrement must be equivalent across the three groups so that variations in transfer can be attributed to comparative processes between the practice and test figures and not to differences in the magnitude of the decrement reduction. The baseline magnitude of the Müller-Lyer illusion is affected by alterations in the contour adjacency and contrast of the figure (these variations affect the involvement of structural factors in the visual system contributing to illusion magnitude). Higher contrast levels between the figure and its background and closer degrees of contour adjacency (small angles between the shaft and wings of the figure) result in higher levels of measured illusion magnitude (see Coren & Girgus, 1978a). Since the color variation that we used affected contrast levels and, therefore, resulted in baseline differences across the groups, we transformed the six decrement practice measurements to percent scores. With the percent transformation, we could make the appropriate analysis of decrement magnitude irrespective of absolute differences in illusion strength across the decrement figures differing in contrast. We took each of the six illusion magnitude scores (physical extent in millimeters minus the subject's setting in millimeters) for every subject and divided it by the illusion score obtained on the first measurement in the decrement portion of the experiment. This method gave a measure of the percentage of illusion remaining at every interval across the 5-min period, starting with a common 100% at the outset of the decrement practice period. It also provided a common measure of the magnitude of decrement relative to each subject's and group's performance.

With the percent scores as the dependent measure, we conducted a preliminary analysis of variance with the three

decrement groups (the two Different groups and the Same group) and measurement starting position (ascending and descending trials) as between factors and minutes of exposure as a within factor ($3 \times 2 \times 6$). There were no significant main effects of group membership or measurement starting position, nor were there any significant decrement $\times$ group or measurement interactions. However, there was a significant main effect of inspection time [$F(5,150) = 6.94, p < .001$], indicating that a significant change in illusion magnitude (or the percent of illusion remaining) had occurred over the 5-min period. Since there were no between-group differences, we collapsed across the two color variation groups to form a combined Different group. Once again, an analysis of variance showed no significant main effect of group membership or any group $\times$ time interactions. Only the minutes of exposure factor showed a significant main effect [$F(5,170) = 5.73, p < .001$]. These data are shown in Figure 2A and confirm that equivalent decrement occurred across all groups in the experiment.

Once we had established that a significant training effect had occurred, we assessed the degree of transfer to the Same and the Different color illusion variants. Transfer of the decrement effect is reflected in any diminution of the illusion magnitude score between the initial pretest and the final posttest measurement of the transfer figure. An analysis of variance with group membership (Same and Different) as a between factor and illusion score (pretest and posttest) as a within factor showed significant differences in the pre- versus posttest scores [$F(1,34) = 28.80, p < .001$]. There were no main effects of group membership and no interaction between the groups and the illusion scores. This analysis verified that significant transfer (that is, reduction in illusion magnitude from pre- to posttest) had occurred, and it seemed to be equivalent across the Same and Different conditions. We explored this effect further by computing a transfer score, which was the difference between the two measurements (pretest

illusion score minus posttest illusion score). Analyses of variance showed no significant differences in the magnitude of these transfer scores when the three groups were analyzed individually and again when the two color variations were combined into one Different group. As Figure 2B shows, the transfer was approximately equal in both groups, with pretest, posttest reductions in illusion magnitude of 5.83 mm in the Same group and 6.29 mm in the combined Different group.

The results of this experiment suggest that strict identity of the illusion figure is not encoded as part of the decrement process. Chromatic changes alter the subject's awareness of stimulus changes, but this fact is not sufficient to produce alterations in transfer of decrement. Chromatic changes are not figural changes; they alter awareness of stimulus differences, but the characteristic outlines (or the figural gestalt) of the Müller-Lyer figure remain the same. Once we had established that awareness of test and practice figure differences was not a factor in producing variations in decrement transfer, we designed the following two experiments to test our contention that figural alterations, of either the local or global features of the stimulus, were the primary mechanisms that affected the transfer.

EXPERIMENT 2: LOCAL FEATURE VARIATION

Our second experiment tested the effects of local variations of features on the transfer of decrement. As stated previously, a local feature change is one that alters the basic elements of the Müller-Lyer figure, namely angles and line segments, without altering the characteristic relationships between these elements, which identify the figure as the Müller-Lyer array. We changed the size of the angles between the wings to accomplish this local variation. Figures 1F and 1G are both the Brentano form of the illusion and, thus, are similar at a global level. Nonetheless, there are clear differences between the two arrays because the shaft-wing angle in Figure 1F is 30° while that in 1G is 60° . The effect of this local variation was explored in Experiment 2.

Method

Stimuli. Two types of Müller-Lyer figures were used in this experiment. All were drawn in black with linear dimensions and reflectance values identical to those described for the black figure in Experiment 1. However, one of the figures differed in that the angle between the horizontal and the wings was 60° (1G), whereas the other figure was identical to that described in Experiment 1, with a wing angle of 30° (1F). The apparently shorter portion of both the 30° and the 60° figures was fixed, while the apparently longer portion was adjustable by means of a sliding tongue-and-groove arrangement.

Procedure and Subjects. Fifty-six undergraduate volunteers participated as subjects in this experiment. All met the visual requirements described in Experiment 1. None of these subjects had participated in the previous experiment, and all were naive as to the purpose of the experiment.

The subjects were assigned randomly to one of four groups. Two groups experienced decrement on the 30° figure, and two groups

Figure 2. Experiment 1, in which practice and test figures differed in identity (color): (A) Decrement in illusion magnitude for the Same and Different groups plotted against minutes of decrement exposure. The data are shown as percent illusion remaining after each minute of decrement exposure. (B) Transfer of decrement (illusion magnitude, in millimeters, at pretest minus illusion magnitude at posttest) for the Same and Different transfer groups.

underwent decrement on the 60° figure. There was a Same and Different condition within each of the decrement conditions in order to test for transfer. One set of subjects who decremented on the 30° figure was pre- and posttested on an identical 30° figure (Same); the other set of subjects was pre- and posttested on a 60° figure (Different). The same arrangement occurred for the 60° decrement groups. The Same condition experienced pre- and posttesting on an identical 60° figure, and the Different condition was pre- and posttested on a 30° figure. This experiment was conducted in a fashion identical to that described in Experiment 1 in all other respects.

Results and Discussion

Prior to testing the degree of the transfer effect, we first determined that illusion decrement had occurred in an equivalent fashion for our various groups. We conducted a preliminary analysis of variance with group membership (the two Different groups and the two Same groups) and measurement starting position (ascending and descending trials) as between factors and minutes of exposure as a within factor ($4 \times 2 \times 6$). Once again, because variations in angle size affect the baseline illusion magnitude (see Coren & Girgus, 1978a), we used the transformation into percent illusion scores as described in the previous analysis of Experiment 1. There were no significant main effects of either group membership or type of measurement trial, nor were there any significant interactions between the factors. Only the within factor of minutes of exposure showed a significant main effect [$F(5,240) = 8.29, p < .001$], indicating that substantial reduction in illusion magnitude had occurred over the decrement period. Since this analysis showed no between-group differences or interactions, we combined the two Different groups (30°-60°-30° and 60°-30°-60°) and the two Same groups (30°-30°-30° and 60°-60°-60°) and conducted an analysis of variance on the percent illusion scores across the six measurements of the decrement period. Group membership (Same and Different) was a between factor in this analysis. There was no main effect of group membership and no significant interactions; only the minutes of exposure factor showed a significant main effect, similar to that of the previous analysis [$F(5,270)$

$= 8.40, p < .001$]. The results of this analysis of variance are shown in Figure 3A.

Once we had established that all of the groups had responded in a similar fashion during the decrement training period, we assessed the amount of transfer. An analysis of variance with group membership as a between factor and pre- and posttest illusion scores as a within factor indicated only a significant main effect of testing condition (pre- vs. posttest) [$F(1,52) = 35.68, p < .001$]. A similar significant main effect resulted from an analysis of variance in which we collapsed across the two Same and Different conditions [$F(1,54) = 35.14, p < .001$]. Since there were no main effects of group membership and no interactions with the pre- and posttest scores, we concluded that significant reduction from pre- to posttest had occurred that was equivalent across the experimental groups. Next, we explored the transfer effect using the pre- and posttest difference scores as the dependent measure. Separate analyses of variance revealed no significant effects of group membership when the four groups were analyzed separately and when they were combined into Same versus Different groups. As Figure 3B shows, the mean amount of transfer was 7.0 mm for the Same group and 6.64 mm for the Different group. Thus, an equivalent amount of decrement transfer occurred across all groups, regardless of the presence or absence of pre- and posttest figural differences in angle size.

These results indicate that the process responsible for illusion decrement is not affected by local feature variation. Next we asked whether or not global changes in the illusory configuration affect the transfer of training process.

EXPERIMENT 3: GLOBAL FEATURE VARIATION

Our original hypothesis proposed that global organization (the relationship among stimulus elements that impart a characteristic and unique identity to a form) is the salient feature encoded during decrement that alters the transfer process. Local and global levels of figural interpretation were manipulated simultaneously in the original transfer of decrement study by Coren and Girgus (1974); for this reason, one could not attribute the variations in decrement transfer to a specific figural alteration, only to overall perceived similarity. However, we devised a stimulus manipulation that changed the relationship among the stimulus elements while keeping constant the elements, or local features, themselves. An alteration of the figure's orientation accomplished this goal. A number of studies have shown that changes in stimulus orientation alone can affect the identification of complex forms, such as faces and letters of the alphabet. These effects suggest that orientation is a global organizational feature that imparts uniqueness to a form by activating a distinct set of information processing activities. When the orientation is changed, these processing activities are disrupted and form recognition is impaired (see Corballis & Beale,

Figure 3. Decrement (A) and transfer-of-decrement (B) results from Experiment 2 when practice and test figures differed in local features (wing angles).

1983). We rotated the classic Brentano version of the Müller-Lyer figure (see Figures 1F and 1H) to produce a global-feature alteration. As one can see, the local features are identical in the rotated and classic versions; however, the 180° rotation changes the characteristic right-left relationship among the stimulus elements. Although Figure 1H can still be identified as the Müller-Lyer illusion, we propose that the 180° rotation alters the global interpretation of the form in the same way that inversion of a face or rotation of a letter retards figural identification. Experiment 3 tests the salience of global changes in the transfer-of-illusion decrement.

Method

Stimuli. We used two types of Müller-Lyer figures in this experiment. Both were drawn in black and were identical in linear dimensions and reflectance values to the black figure described in Experiment 1. One figure was presented with the apparently longer segment drawn on the right and the apparently shorter segment displayed on the left (as in Figure 1F); the second illusion figure was in the reverse orientation (1H). The left portion of each figure (whether it was the apparently shorter or longer segment) was fixed; the right portion was adjustable by means of a sliding tongue-and-groove arrangement.

Procedure and Subjects. The subjects were 36 undergraduate volunteers who met the visual requirements described previously. None had participated in Experiment 1 or Experiment 2, and all were naive as to the purpose of the experiment. The subjects were assigned randomly to one of three groups. One group, the Same condition, was pre- and posttested on the illusion figure in its standard orientation (1F) and also experienced decrement training on this variant. The other two groups, the Different conditions, were pre- and posttested on variants that differed from the decrement figure. One of these groups experienced decrement on the standard figure (1F), with the apparently longer segment on the right, and was pre- and posttested on the figure with the reverse orientation (1H). The other Different group underwent decrement on the reversed figure (1H) and was pre- and posttested on the standard version (1F) of the illusion. In all other aspects, the procedure was identical to that outlined for Experiment 1.

Results and Discussion

As discussed in the previous two experiments, we assessed the equivalence of decrement across the groups by conducting a preliminary analysis of variance with group membership and measurement starting position as between factors and minutes of exposure as a within factor ($3 \times 2 \times 6$). As in the previous two experiments, we used percent illusion as the dependent measure. There were no main effects of either group membership or measurement position, and there were no significant interactions. Only the main effect of exposure interval was significant [$F(5,150) = 7.26, p < .001$], indicating, once again, that decrement had occurred across all groups. For this reason, we collapsed across the two different orientations and analyzed the decrement effect again, with Same versus Different groups as the between factor. As in the previous two experiments, only the exposure time main effect was significant [$F(5,170) = 6.51, p < .01$]. As Figure 4A shows, equivalent decrement occurred across the two groups.

Figure 4. Decrement (A) and transfer-of-decrement (B) results from Experiment 3 when practice and test figures differed in global features (orientation).

Next, we evaluated the amount of transfer-of-illusion decrement. An analysis of variance with group membership as a between factor and pre- versus posttest illusion scores as a within factor showed both a significant main effect of the test period factor [$F(1,33) = 19.58, p < .001$] and a significant interaction between group membership and test period [$F(2,33) = 6.61, p < .01$]. This finding indicated that illusion magnitude had changed significantly across the pre- and posttest interval (in other words, transfer had occurred); in addition, it showed that this change was different for the three experimental groups. We explored this interaction further with analyses that used the pretest, posttest difference scores as the dependent measure. Analyses of variance with the difference scores showed a significant effect of group membership on the magnitude of the transfer effect [$F(2,33) = 6.61, p < .01$]. Individual group comparisons revealed that both of the Different orientation groups differed significantly from the Same orientation group [$t(33) = 3.16, p < .01$, and $t(33) = 3.13, p < .01$, respectively], but they did not differ significantly from each other. Therefore, we collapsed across the two Different orientation conditions to assess a mean transfer effect for these groups as compared with the Same orientation condition. An analysis of variance showed a significant difference in the amount of transfer between the Same and Different conditions [$F(1,34) = 13.61, p < .001$]. Figure 4B shows the results of this analysis. The mean amount of transfer in the Different condition was 1.88 mm; that for the Same orientation was 9.67 mm.

GENERAL DISCUSSION

We have explored the cognitive factors that affect the transfer of illusion decrement among variants of the Müller-Lyer figure. Coren and Girgus (1974) showed that the amount of illusion reduction transferred between variants depended on the judged similarity between the test, or transfer figure, and the practice or decrement figure. The present three studies indicate that some levels of

figural processing are more important than others in determining transfer. Specifically, the global form of the configuration must be kept constant if there is to be transfer of illusion decrement among variants. In turn, this finding implies that judgments of close figural similarity among illusion variants (where decrement transfer effects are the greatest) are based on global organizational principles and not on identity of specific features.

The present results extend the findings from other literature on form and pattern perception that suggest a priority of global-feature extraction over that of local features (Navon, 1977, 1981). The transfer-of-illusion decrement seems to be controlled by such a processing hierarchy; global similarity between configurations is established before illusion decrement is transferred from one array to another. If this is the case and illusion arrays respond like the other types of stimuli that have been studied in the context of processing hierarchies, then one should also find that illusion transfer phenomena will respond to manipulations that affect or reverse this *processing dominance*. Variations in retinal size, attentional allocation, and conspicuity and identity of the local features, which have been shown to alter the global processing precedence in other studies (Hoffman, 1980; Kinchla & Wolfe, 1979; Martin, 1979; Pomerantz, 1983; Ward, 1982), should also cause variations in the relationship between decrement transfer and global similarity. Ward (1983) defined processing dominance as relevant to an aspect of a form if that aspect "is shown to be responded to faster or more accurately, to interfere with processing of other aspects or forms, to be itself resistant to such interference, to be remembered more accurately, to be more resistant to degradation, or to be perceivable under shorter exposure durations or under more noisy exposure conditions" (p. 542). In addition, Pomerantz (1983) and Ward (1982, 1983) argue that the decision to pay attention to one level of form processing (either local or global) will affect its processing dominance in the manner described by Ward (1983). We found transfer interference effects only when we altered the orientation of the stimulus during the pre- and posttest. Thus, our interpretation of a global change produced results consistent with the definition of processing dominance in multilevel visual forms. This finding supports the contention that, during the decrement process, subjects either choose to attend to the overall characteristic features of the Müller-Lyer or these features are more conspicuous by their nature and capture the subject's attention naturally. Whatever the exact mechanism, this level of form processing assumes processing dominance and becomes the basis of decrement transfer.

However, we must also speculate on another possibility, namely that the global change associated with the right-left reversal produces unique effects not observable with other types of global changes. For example, Festinger et al. (1968) have shown that the eye tends to undershoot the vertexes of the wing-shaft angle in the perceptually underestimated portion of the Müller-Lyer but overshoots the vertexes in the overestimated segment.

During decrement, these overshoots and undershoots are corrected, leading to a more precise fixation of the vertexes of the figure. We can predict the lack of decrement transfer to a stimulus figure that is reversed in the right-left direction if information from these saccadic corrections is used only in connection with the specific region of the visual field where they were first emitted. This would imply that directional information is part of the coding of stimulus similarity that seems to guide the transfer effect. Other global changes that do not alter the direction of the stimulus may not produce similar asymmetries of transfer. Although these experiments, in combination with the Coren and Girgus (1974) study, strongly indicate that it is the global form organization rather than the directional qualities that determine transfer, this latter possibility must also be considered.

Although these experiments are just a preliminary step, they have uncovered some interesting phenomena related to visual geometric illusions and the decrement process. First, they place illusion arrays into the context of multilevel forms that display processing dominance asymmetries. This finding opens new possibilities for the use of the decrement and transfer-of-decrement paradigm. Second, they suggest that global organization, and not local feature similarity, is the guideline for establishing perceptual equivalence among illusion forms; it is this equivalence that affects the generalizability of this type of perceptual learning.

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