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Size-distance paradox with accommodative micropsia*

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Two experiments tested the hypothesis that the paradoxical relative distance judgment associated with the size-distance paradox is due to the visual system's assuming equal linear size and perceiving a smaller angular size for the closer stimulus equal in visual angle. In Experiment I, two different sized coins were presented successively, and 16 Ss were asked to give ordinal judgments of apparent distance and apparent size. When the two coins depicted the same figures, the closer stimulus was judged to be farther and smaller, more frequently, than when two coins depicted different figures. In Experiment II, 48 Ss were asked to give ratio judgments of apparent distance, apparent linear size, and apparent angular size for two stimuli which were presented successively. When the stimuli were of equal shape, the mean ratios of the far stimulus to the near stimulus were smaller for the apparent distance but larger for the apparent linear size and angular size than when the stimuli were of different shape. The obtained distance judgments were consistent with the hypothesis but the obtained judgments of linear size and angular size were not.

The purpose of the experiments reported here was to define some experimental conditions in which the size-distance paradox occurs with accommodative micropsia and to retest the hypothesis proposed by Komoda (1970) and Komoda and Ono (1974). Accommodative micropsia refers to a decrease in the perceived size of a stimulus whose visual angle remains constant when accommodation is increased. The phenomenon of change in perceived size with change in accommodation is empirically well established, although the contribution of the associated change in convergence is not clear (e.g., Biersdorf, Ohwaki, & Kozil, 1963; Heinemann, Tulving, & Nachmias, 1959; Leibowitz & Moore, 1966; Leibowitz, Shina, & Hennessy, 1972). In this experimental setting, size-distance paradox refers to an increase in perceived distance with decreased perceived size (Epstein, Park, & Casey, 1961). The underlying hypothesis was that the paradoxical distance judgment is an outcome of a conflict resulting from contradictory distance information.

The hypothesis can be made explicit by reference to Fig. 1, which shows two stimuli (S_1 and S_2) at different distance but subtending equal visual angles. Figure 1 also shows that the location of the egocenter from which S makes directional judgments is behind the interocular axis. The reason for placing the egocenter behind the interocular axis stems from the findings of Funaishi (1926) and Roelofs (1959). In the situation depicted in Fig. 1, if accommodation is correctly monitored, the difference in the visual direction subtended by the stimulus at the egocenter (angular size = α) will be smaller for S_1 than for S_2. The reason for the smaller angular size of S_1 is that the egocenter is located behind the interocular axis (Ono, 1970). If the visual system "treats" S_1 and S_2 as different objects, no conflict emerges, because in the usual experience of the visual system, a closer object can be smaller in angular size and linear size than a more distant object. In this instance, the distance judgment should agree with the prediction based on the size-distance invariance hypothesis. However, the usual experimental arrangement is to make S_1 and S_2 as similar as possible in appearance. If the visual system "assumes" that S_1 and S_2 are the same object or identically sized objects because of their similar appearance, then a conflict will emerge. On the one hand, the accommodative state provides direct information that S_1 is nearer than S_2. On the other hand, when an object of presumed constant linear size undergoes a decrease in angular size, the visual system is likely to "conclude" that S_1 is farther away than S_2. The reason for this hypothesized perceptual outcome is that in the normal experience of the visual system the angular size of an object decreases as its distance increases. In the resolution of the conflict, if the visual system maintains its "assumption" that S_1 and S_2 are identical, then the size-distance paradox is likely to occur, i.e., S_1 is likely to be perceived as farther away than S_2.

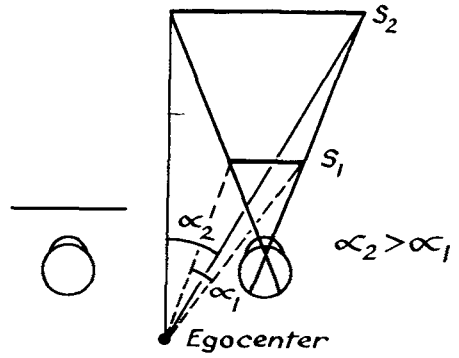

Fig. 1. Illustration of experimental situation and the hypothesis. See text for explanation.

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The present hypothesis concerning the paradoxical distance judgment assumes multilevel or multistage processing of distance information. The hypothesis states that when two similar stimuli are presented a conflict will occur between (a) the distance information provided by the state of accommodation and (b) the distance information provided by angular size together with the assumption that the stimuli are equal in linear size. It should be noted that both (a) and (b) assume that the visual system processes the accommodative state, but the distance information in (a) is processed at a different level or stage than in (b). In (a), the distance information is processed directly from the accommodative state. In (b), for the visual system to determine that the closer object (with equal visual angle) is smaller in angular size, the distance information from the accommodative state is also necessary. Hence, the size-distance paradox is an instance of the visual system's being "illogical." In other words, to determine the angular size, the near stimulus was processed as closer, but later, or at a different level, the visual system ignored this fact and "concluded" that the stimulus with the smaller angular size was farther away because of its presumed equal linear size.

Although Komoda (1970) and Komoda and Ono (1974) found some support for this hypothesis by varying convergence, their results were not exactly as predicted. For example, the hypothesis predicts a "negative slope" of apparent distance linearly regressed on convergence distance when the visual system assumes equal linear sizes for stimuli at different convergence distances, but a "positive slope" when the visual system does not. However, what they found was a significantly shallower positive slope in the condition in which the visual system was expected to assume constant linear size. That is, the group as a whole did not report size-distance paradox in the appropriate condition.

The aim of the present experiments was to obtain more convincing support for the hypothesis. The underlying notion was that the manipulation of accommodation instead of convergence might lead to more convincing data. This expectation was based on the assumption that accommodation or accommodative vergence is a weaker distance cue than convergence or fusional vergence and therefore is more easily rejected by the visual system (cf. Gogel & Sturm, 1972; Morgan, 1968). In Experiment I, a previously investigated experimental setting which was known to produce size-distance paradox was employed to test the hypothesis. In Experiment II, a similar experimental setting with a more elaborate judgmental task was employed to investigate the relative magnitudes of apparent sizes, apparent angular sizes, and apparent distances for two different accommodation distances.

EXPERIMENT I

To demonstrate the importance of the nature of the stimulus to produce size-distance paradox, ordinal judgments of apparent distances were obtained for two different-sized Canadian coins set at distances such as to produce equal visual angles. The experimental setting and judgmental task were those employed by Heinemann et al (1959), who obtained a relatively high frequency of paradoxical distance judgments. There were two conditions: in one condition, the head sides of two coins were shown; in the other condition, the tail sides were shown. The head sides of the two coins depicted the same figure, and the only difference was their linear size. In each condition, the two coins were presented successively on each trial. The underlying notion was that when two similar figures are presented, the visual system is more likely to assume that the same stimulus is being presented. Hence, the prediction was that when the head sides of the two coins were presented, size-distance paradox should occur more frequently than when the tail sides were presented.

Method

Subjects. The 16 Ss were university undergraduates who received course credits for participating in the experiment. All Ss had visual acuity of 20/25 or better, and none wore glasses.

Apparatus. The images of a Canadian dime and a Canadian silver dollar were aligned on a common optical pathway by means of a beam-splitter and mirror arrangement. The head sides of the two coins were identical in every respect except their linear size. The tail side of the dime depicted a completely different figure from the tail side of the dollar. Both coins subtended a visual angle of 3 deg at the pupil of the eye, and the distance from the pupil to the dime was 34 cm and to the silver dollar, 70.3 cm. The coins were viewed monocularly through an 0.6-cm aperture immediately in front of the eye. A series of baffles was placed on the two optical paths in such a way that only one coin was visible when the appropriate light was turned on. The apparatus, draped with black cloth, formed a booth approximately 2 x 1 x 1 m, with the viewing aperture at one end and the viewing axis along the length of the booth.

Experimental Design. The major experimental variable was the viewing condition: in the head-head condition, the head sides of the two coins were shown; in the tail-tail condition, the tail sides were shown. In these two conditions, ordinal judgments were made for the relative apparent distance and the relative apparent size of the two coins. All distance judgments were completed before any size judgments were made, the latter being included only to ascertain whether or not micropsia had occurred in the experiment. The Ss were randomly assigned to one of four groups, each group differing in the order of the two viewing conditions for the distance and size judgments. For each type of judgment in each viewing condition there were 20 trials, a trial consisting of the presentation of two coins in succession. In 10 trials, the dollar coin was presented first, and in the other 10 trials, the dime was presented first, the order of these presentations being randomly determined with the restriction of equal frequencies of the two types of trial.

Procedure. The Ss were instructed that when the first coin appeared, they should allow the viewing eye to "focus," form some idea of the distance of the coin, and report to E when ready to proceed. They were also informed that when the second coin appeared, they should again allow the viewing eye to "focus," and report whether the second coin seemed closer (smaller) or farther away (larger) than the first, in a two-category

forced-choice paradigm. They were asked to report only the relative perceived extent (i.e., what they saw rather than what they thought). The E told S to view only with the right eye while keeping the left eye open, and not to move the head as the stimulus was being presented. If the S's head was not in the correct position, a portion of the coin would be occluded by the baffles. Those trials in which S saw only a portion of the coin were repeated, although the number of such trials was small. The two stimuli were each presented for about 2 sec, separated by a 1- to 2-sec period. Each block of 20 trials was followed by a 1-min break. The experiment was conducted in a darkened room.

Results and Discussion

In each viewing condition, the data obtained were 20 ordinal judgments of distance of the two coins (a dollar piece and a dime). Of the 16 Ss, 13 Ss had a greater proportion of trials in which the far stimulus appeared closer in the head-head condition relative to the tail-tail condition. The mean proportions across Ss were .79 and .37 for the head-head condition and the tail-tail condition, respectively. The difference is statistically significant [Wilcoxon test, $T(16) = 9$, $p < .01$].

The hypothesis that a stimulus identity or an equal linear size assumption leads to size-distance paradox found support in Experiment I. Unlike Komoda (1970) and Komoda and Ono (1974), the stimuli and the procedure used in Experiment I succeeded in producing size-distance paradox in the appropriate condition. The mean proportion of .79 in the head-head condition can be considered to reflect a "negative slope" of apparent distance on accommodation distance, although the shape of the function cannot be determined. This finding is consistent with the notion that the distance information from accommodation may be easier for the visual system to reject, but another contributing factor may be the stimuli used. Possibly, the use of coins as stimuli is a more effective way of inducing the equal size assumption than the use of plain disks.

The present results suggest the reason why the paradox occurs in well-controlled experiments (e.g., Heinemann et al, 1959). In an attempt to eliminate all distance cues in the usual experiment to study micropsia, one uses stimuli as similar as possible in the stimulus characteristics of shape, color, and brightness. The results of Experiment I suggest that attempts for this control would increase the possibility of obtaining the paradox.

In Experiment I, Ss were also asked to make ordinal judgments of "size," but the hypothesized distinction between angular size and linear size was not pointed out to Ss. These measurements were intended to ascertain whether some kind of micropsia (angular or linear) occurred in the experimental situation as it did in Heinemann et al. The results showed that micropsia occurred as expected, in both conditions. The mean proportion of trials in which the closer coin appeared smaller was .89 and .76 for the head-head condition and the tail-tail condition, respectively. The significantly greater proportion of micropsia in the head-head condition [Wilcoxon $T(12) = 3.5$, $p < .01$] was an unexpected result. Eleven of 16 Ss showed a greater proportion of micropsia in the head-head condition, 1 S had a greater proportion in the tail-tail condition, and 4 Ss were equal in the two conditions. This result is contrary to the viewpoint of the present hypothesis, which states that the size-distance paradox should occur when the linear size is processed as being equal for both stimuli and the angular size of the closer stimulus is processed as being smaller. Thus, if S is reporting a judgment based on linear size, there should be a greater proportion of micropsia in the tail-tail condition than in the head-head condition. If S is reporting a judgment in terms of angular size, the proportion of micropsia should be the same in both conditions. Since the distinction between angular size and linear size was not made to Ss, it is impossible to know which size Ss were reporting. Regardless of which size they were reporting, the results are contrary to the hypothesis.

EXPERIMENT II

Experiment II was designed to verify the unexpected results of Experiment I and to determine the relative magnitude of the apparent linear size, the apparent angular size, and the apparent distance of stimuli at different accommodation distances. As in Experiment I, there were two conditions: in one condition, same-shaped stimuli of equal visual angle were presented, whereas in the other condition, different-shaped stimuli (cross, octagon, and square) were presented. The stimuli were presented at two different distances successively, and Ss were asked to give ratio judgments of apparent distance, angular size, and linear size of the two stimuli. It was assumed that, in the first condition, the visual system would be more likely to treat the stimuli as being identical in linear size.

Method

Subjects. The Ss were recruited from the university community and were paid for participating in the experiment. All 48 Ss had visual acuity of 20/20 or better using unaided vision or contact lenses.

Apparatus. The basic apparatus consisted of two light boxes with diffusing Plexiglas screens mounted on perpendicular horizontal axes. Interchangeable cardboard slides with symmetrical, variously shaped (cross, octagon, and square) cutouts could be attached in front of each box. These slides formed the near and far stimuli, which were located 20 and 80 cm, respectively, from the S's eye. The luminance of the stimuli was .15 fL. In all cases, the visual angle subtended by the horizontal dimension and the vertical dimension of the three stimuli was 7.5 deg. The images of the near and far stimuli were combined on a single optical axis by means of a beam splitter. A guillotine door, controlled by E, was inserted between the beam splitter and the viewing aperture, which was 8 mm in diam. The alternation between the near and the far stimuli was regulated by automatic time circuits. A chin- and headrest combination served to immobilize the S's head. The entire apparatus, with the exception of the aperture, the headrest, and the chinrest, was draped in black cloth.

Table 1
The Geometric Means and Geometric Standard Deviations of the Ratio Judgments for Distance, Angular Size, and Linear Size for the Two Conditions for Experiment II

Judgment		Condition: Same Shape	Condition: Different Shape
Distance	Mean	100.37	108.07
	SD	1.47	1.27
Linear Size	Mean	108.02	104.20
	SD	1.12	1.12
Angular Size	Mean	112.09	108.79
	SD	1.14	1.15

Experimental Design. The major experimental variable was the viewing condition, the two conditions being (a) the same-shape condition, in which same-shaped stimuli of equal visual angles were presented, and (b) the different-shape condition, in which different-shaped stimuli of equal visual angles were presented. The Ss made distance, linear size, and angular size judgments in these two conditions. There were six trials in each condition: three trials in which the far stimulus was presented first and three in which the near stimulus was presented first. These two types of trials were randomly presented, with the restriction of equal frequency. In the pilot study, Ss reported substantial difficulty in making three types of judgments for the given exposure time. As a result, only two types of judgments were required for a given trial. For half the trials, Ss made distance and angular size judgments, and for the other half, Ss made distance and linear size judgments. A different S performed in each cell of a four-way factorial design, in which the factors were: (a) order of the two conditions, (b) distance judgments preceding or following angular size and linear size judgments, (c) distance judgments with linear size judgments preceding or following distance judgments with angular size judgments, and (d) the six possible combinations of the three cut-out shapes used for the far and near stimuli in the different-shape and same-shape conditions. (The cut-out shapes used in the same-shape condition did not appear in the different-shape condition.)

Procedure. Prior to the experimental session, S was seated in front of the apparatus and the chin- and headrest was adjusted to hold his head in a position such that the right eye was as close as possible to the aperture and two alignment stimuli were reported to be superimposed. The alignment stimuli were two point sources of light which corresponded to the centers of the near and far stimuli at 20 and 80 cm. The S was given the definitions of distance and either angular size or linear size, depending on the condition to follow. The linear size and distance were defined in a usual manner (i.e., the linear width of the stimulus and the linear extent between the bridge of the nose and the stimulus, respectively). The angular size was defined as the amount of imaginary horizontal head rotation necessary to point the nose from one edge of the stimulus to the other edge. The S was asked to report the ratio of the two perceived extents (i.e., the ratio of the two extents they saw rather than the ratio of what they thought the extents should be). In all trials, S was asked to assign a value of 100 to the first stimulus for the dimensions of distance, and either angular size or linear size, and to report the relative values of the second stimulus. Two familiarization trials were administered before the experimental session began. For a given trial, immediately after the guillotine door had been raised, the first stimulus was turned on. Three seconds later, the first stimulus was automatically extinguished and, following a 1-sec interval, the second stimulus was turned on for 3 sec. The guillotine door was lowered immediately after the second stimulus was turned off. The Ss were then required to give the appropriate ratio judgments, which were recorded by E. Throughout the experimental session, 2-min breaks occurred after every six trials.

Results and Discussion

The basic data for Experiment II were ratio judgments of apparent distance, apparent linear size, and apparent angular size for a trial in which two stimuli were presented successively. In half the trials, the near stimulus was presented first, and in the other half, the far stimulus was presented first. The geometric means for each type of judgment and for each S were computed with adjustments for the two types of trials (i.e., the ratios obtained from half the trials were transformed). The adjustments were made so that the geometric mean would represent the judgment values of the far stimulus over the near stimulus. Hence, a numerical value over 100 represents a judgment of the far stimulus being larger or farther away. The geometric means and standard deviations of these ratios across Ss for two conditions for the three types of judgments are shown in Table 1. T tests performed on the three sets of data revealed that two sets of means were significantly different. (Since the data were ratios, the statistical analyses were performed on their logarithms.) The differences were significant between the two conditions for both the distance and the angular size judgments, $t(47) = 3.26$, $p < .01$, and $t(47) = -2.57$, $p < .02$, respectively. The difference was not quite significant, $t(47) = -1.95$, for the linear size judgments.

The difference in the distance judgments between the two conditions confirms the results of Experiment I and supports the hypothesis that the condition in which the stimulus identity assumption should operate leads toward the occurrence of size-distance paradox. In the same-shape condition, the far and the near stimuli were judged to be almost equidistant, whereas in the different-shape condition, the far stimulus was judged to be farther away. The fact that the mean ratio in the same-shape condition was near 100 indicates that the group as a whole did not produce paradoxical distance judgments, unlike the group in the head-head condition in Experiment I. Perhaps the same-shaped stimuli are not as effective as the heads of coins in producing the equal linear size assumption in the visual system. However, the directional differences between the two conditions were consistent with the results of Experiment I.

For the linear size and angular size judgments, the mean ratios are larger in the same-shape condition, although only the difference in the angular size judgment reached statistical significance. These differences indicate that there is a greater extent of angular and linear size micropsia in the same-shape condition. This is incompatible with the present hypothesis. Our hypothesis concerning angular size predicted that micropsia would occur in the two conditions, but it did not predict that one condition would produce a greater extent of micropsia. Our hypothesis concerning linear size predicted a small

extent of micropsia, or no micropsia, in the same-shape condition. Although the difference is not quite significant, the obtained results are in the opposite direction. This aspect of the results coincides with the unexpected results of Experiment I, in that there is greater micropsia in the condition in which the "stimulus identity assumption" is enhanced.

The results of the apparent linear and angular size judgments in Experiment II and those of the "apparent size" judgment in Experiment I are puzzling, not only because there is no obvious theoretical explanation, but because greater micropsia in the conditions in which the stimulus identity assumption was enhanced was not expected from the results of Komoda (1970) and Komoda and Ono (1974). Their results showed that the slope of apparent linear size on the convergence distance was slightly shallower in the stimulus identity condition than in the stimulus nonidentity condition (although the interaction between conditions and convergence distance was not statistically significant). Moreover, the slopes of the apparent angular size for the two conditions were approximately equal. Although the aim and the underlying hypothesis were the same as in the present experiments, there are several methodological differences which might have produced the discrepancies; namely, (a) manipulation of convergence level rather than accommodation level; (b) use of a training procedure for judgmental tasks and nonuse of a training procedure; (c) different judgmental tasks; and (d) different exposure time of the stimuli.

Given these differences in the procedures, another experiment was conducted to explore the reason for the differences found in the two studies. In this experiment, the same stimulus arrangements as that of Experiment II was used under the same two viewing conditions (same-shape and different-shape), but the exposure time and the judgmental task (scalar judgments) were used as in Komoda and Ono (1974). One set of 18 Ss participated in the experiment after the training of scalar judgments under full-cue conditions in exactly the same way as in Komoda and Ono (1974), and another set of 18 Ss served without the training. The basic idea was that if the overall results differed from the present results, the discrepancy with the earlier studies (Komoda, 1970; Komoda & Ono, 1974) would be due to the exposure time and/or the judgmental task, and if there was a difference between the training and no-training conditions, the discrepancy would be due to the training procedures. The details of this experiment will not be reported here because there was no suggestion of any of these variables being responsible for the greater micropsia in the same-shape condition, and most of the statistically significant main effects and interactions are not germane to the present discussion.[1] (The experimental outcome implies that the discrepancy to be explained might be due to the processes involved in accommodation and convergence. However, the question of how the difference in the processes might lead to the discrepancy was not explored.)

The results pertinent to the present discussion are the further confirmation of the shallower slope of apparent distance on the accommodation distances in the same-shape condition and greater angular and linear size micropsia in the same-shape condition. The interaction of Distance by Viewing Condition for the apparent distance was significant [$F(1,34) = 5.64$, $p < .025$). Although the interactions of Distance by Viewing Condition for apparent angular size and apparent linear size were not significant, 27 and 26 Ss out of the 36 Ss showed greater linear size micropsia and angular size micropsia, respectively, in the same-shape condition. That is, there were more Ss who had a greater ratio of apparent size at 80 cm to apparent size at 20 cm (sign test, $p < .01$, $p = .012$ for linear size and angular size, respectively). These results confirm the findings of Experiments I and II.

GENERAL DISCUSSION

The results of the two experiments indicated that the experimental manipulations, designed according to the hypothesis to induce the size-distance paradox, are successful in obtaining the predicted distance judgments. However, there is no support for the accompanying hypothesis concerning linear size judgments. The head-head condition and the same-shape condition, which were supposed to enhance the stimulus identity assumption, produced distance judgments in the direction of the size-distance paradox, as predicted. In these conditions, the linear size micropsia was expected to be smaller and the angular size micropsia was expected to be equal when compared to the respective comparison conditions. These results were not obtained, and there is, therefore, no support for this aspect of the hypothesis.

Our post hoc interpretation of the results relies on the notion that there is some independence in the processes that underlie size judgments and distance judgments. This notion stems from Ames's distinction between "thereness" (location) and "thatness" (identification) (Ittleson, 1960). Similarly, Held (1967) has recently proposed two modes of processing visual information—locating and identifying. Foley (1972) has also used this distinction to account for his results related to size-distance perception. This distinction implies that the visual system can use different sets of information to make distance, angular size, or linear size judgments. Hence, there need not be a unique relationship between the three types of judgments. Using this distinction, our post hoc interpretation is that our hypothesis concerning the size-distance paradox applies only to the "thereness" and not to the "thatness" of a stimulus. It is possible that the processes described in the hypothesis produced the results of the distance judgment. The results of the two experiments are consistent with such an interpretation in that the

experimental manipulations to produce the paradox are successful and are consistent with the findings of Gogel (1969) and Gogel and Newton (1969) that the "assumed" size only partially determines perceived linear size.

However, since the results of distance judgments are being explained by the independence of size judgments in an admittedly a posteriori fashion, a question arises as to whether the present post hoc hypothesis is meaningfully different from other hypotheses concerning the size-distance paradox. Three other hypotheses will be considered, namely, those of Hake, McCready, and Gogel. Hake's hypothesis (1970) gets away from the usual hypothesis concerning size and distance judgments, and states that size-distance paradox is due to S's inability to separate two dimensions, size and distance, in a certain viewing condition. McCready's hypothesis (1965) is almost identical to the present hypothesis in postulating the angular size ("phenomenal visual angle") as one of the determiners of size-distance paradox, but differs in the explicitness of the requirement of the stimulus identity assumption. Hence, the present hypothesis can be considered to be a modified version of McCready's hypothesis. Gogel's hypothesis (Gogel, in press; Gogel & Sturm, 1971) is similar to the present hypothesis in that the assumptive context of the stimulus (known or familiar size) plays an important role. Gogel's hypothesis, without postulating the angular size as a factor, states that S is likely to report size-distance paradox ("cognitive distance") when he perceives an object to be smaller or larger than expected relative to the familiar size ("off-size"). Presumably, S relies on his cognitive information from past experience, that a far stimulus appears smaller in linear size (cf. Carlson, 1960; Epstein, 1963; Gogel, 1969).

Hake's hypothesis does not seem to account for the present experimental results. Because Ss in the tail-tail condition and in the different-shape condition did reliably judge apparently small-sized objects to be closer the results of distance judgments in the head-head condition and in the same-shape condition cannot be explained by the S's inability to separate size and distance dimensions. There is nothing in the present results that contradicts Gogel's hypothesis, although there is no provision in Gogel's theorizing to account for the angular size micropsia. If the prediction from our hypothesis concerning linear size had been confirmed, an argument might have been made that the present hypothesis has an advantage over that of Gogel and would have argued for the necessity of a theoretical distinction between angular and linear size. However, no such argument is possible from the present results.

The size-distance paradox, which has been known for a long time (e.g., Auber, reported in Hering, 1942; Bappert, reported in Woodworth & Schlosberg, 1962; Donders, reported in von Kries, 1925; Kilpatrick & Ittelson, 1950), is a phenomenon in which size and distance judgments do not agree with the frequently supposed relationship between the two. The hypotheses discussed above are attempts to come to grips with the lack of the supposed relationship in some experimental settings. To these, we can add Gregory's postulate (1966) about primary and secondary scalings used to account for the lack of such a supposed relationship for the Mueller-Lyer illusion under normal viewing, and Baird's butterflies models (1970), which recognize that size and distance judgments frequently fail to fit the supposed relationship. However, it is not clear whether these hypotheses, without postulating an additional factor, can account for the finding that greater micropsia occurs in the conditions in which size-distance paradox also occurs. We have no explanation for this aspect of the results.

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NOTE

1. The details of the method and the results of this experiment can be obtained by writing the first author of this paper.

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