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STIMULUS DETERMINANTS OF THE M-L ILLUSION AND ITS DECREMENT

STIMULUS DETERMINANTS OF THE MÜLLER-LYER ILLUSION AND ITS DECREMENT

by

ROBERT EDWARD DEWAR, M.A.

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AUTHOR: Robert Edward Dewar, B.A. (Mount Allison University)

M.A. (University of Toronto)

SUPERVISOR: Dr. P. L. Newbigging

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SCOPE AND CONTENTS:

Five experiments, involving 456 subjects, were conducted to determine the influence of certain stimulus characteristics of the Müller-Lyer figure on the magnitude of this illusion and on the decrement of the illusion which occurs with practice. The results showed that the magnitude of the illusion is directly related to the length of the oblique lines and inversely related to the angle between the obliques and the prominence of the horizontal line. Reducing the angle between the obliques and reducing the prominence of the horizontal line caused the illusion to decrease more rapidly over a series of 100 trials. The final experiment provided evidence consistent with the interpretation that changes in attention may be responsible for the practice decrement. These results are discussed in terms of perceptual learning.

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CHAPTER ONE

INTRODUCTION

The experiments described in this thesis are concerned with the Müller-Lyer illusion. Interest is restricted to the influence of certain stimulus properties of the illusion pattern on the magnitude of the illusion and on the decrement of the illusion which occurs with practice.

The first experiment was designated to re-examine the influence of the length of the oblique lines and the angle between the oblique lines on the magnitude of the illusion. Although data are available on the effects of these variables, the experiments were conducted some time ago, and in a way that does not meet current standards of design and analysis. In addition, the combination of length and angle in a single experiment provided an opportunity to evaluate the interaction between these variables. Figures with four different angles and four different lengths of the oblique lines were used. The magnitude of the illusion was found to be directly related to the length of the oblique lines and inversely related to the angle between the obliques.

The next two experiments studied the effects of these same two variables on the decrement of the illusion with practice. The results showed that varying the length of the oblique lines had no influence on the amount of decrement over a series of 100 trials. However, smaller angles between the oblique lines resulted in a greater practice

decrement than did larger angles.

The influence of another stimulus variable, saliency of the horizontal line, on the practice decrement was examined in the fourth experiment. The results showed that the magnitude of the illusion decreased more rapidly when the horizontal line was relatively inconspicuous.

The differential effects of angle between the obliques and saliency of the horizontal line on the practice decrement are of particular interest. These effects suggested that the practice decrement of the Müller-Lyer illusion might be understood as a perceptual learning process mediated by an attention mechanism. The final experiment was conducted to obtain evidence relevant to this interpretation. It was argued that what was learned from practice with one stimulus pattern, might be expected to transfer to subsequent performance on other patterns. In this experiment some subjects were trained with a 60-degree Müller-Lyer figure, while others were trained with a 120-degree figure. Subsequent practice was then given with either a 60-degree or a 120-degree figure. The results showed that training with a small-angled figure resulted in a smaller illusion in subsequent practice on a large-angled figure than did training with the large-angled figure itself. This was taken as support for the interpretation that the practice decrement is due to changes in the observer's attention to the stimulus. The implications of this interpretation for perceptual learning are discussed in the final chapter.

CHAPTER TWO

HISTORICAL REVIEW

This thesis reports five experiments concerned with the magnitude and decrement of one of the better known visual illusions, the Müller-Lyer illusion. To provide a background for these experiments this historical review discusses first the place of illusions in psychology, and gives a brief account of the early theories of the illusion and a description of the research dealing with the variables which determine the magnitude of the illusion. Attention is then turned to the two major interpretations (satiation theory and learning theory) of the decrement of the illusion which occurs with practice. Finally, the practice decrement is discussed as it relates to the area of perceptual learning.

Illusions in Psychology

The Müller-Lyer illusion and perceptual illusions in general involve a discrepancy between the perceived properties and the physical or metric properties of a stimulus. This discrepancy is obvious when the illusion-inducing aspect of the stimulus or visual field is removed. These illusions are, of course, not restricted to vision, but are experienced in the auditory and kinaesthetic modalities as well. Even within the visual sense there are illusions of size, brightness, colour, movement, depth, shape, and direction. However, since this thesis deals with a specific

geometrical optical illusion, further discussion will be restricted to them.

Geometrical optical illusion figures are usually line drawings on paper, which produce illusory effects by the pattern of lines or the relative sizes of the parts of the figure. As Dember (1960) points out, these illusions are due to intramodal contextual effects, context stimuli within the same modality as the stimulus being judged. In addition, the illusion effect is due to stimuli present at the same time as the reference stimulus, in contrast to phenomena like figural after-effects or series effects, which result from the presentation of the reference stimulus after the context-providing stimulus has been removed.

Optical illusions may be classified in different ways. There are illusions of extent, involving misjudgment of the size of a stimulus, and illusions of direction, in which the apparent direction of a line deviates from its actual direction. Another distinction is that between illusions of contrast (underestimation of the size of a figure due to the influence of larger adjacent figures), illusions of confluence (assimilation of one part of the figure by another such that the two parts appear to belong together), and illusions produced by intersecting lines.

Many attempts were made during the latter part of the nineteenth century to explain visual illusions. At that time there was a great deal of interest in illusions as a means of studying visual space perception and the subjective conditions of form. It was also

thought that knowledge of the principles of abnormal perception would help in understanding normal perceptual processes. Just as the students of medicine studied pathological states of the body to get information about normal processes, so psychologists studied illusions in their attempts to understand the functioning of the mind. "The study of illusions belongs properly to the pathology of the mind, just as the study of the abnormal or diseased condition of any bodily function belongs to the pathology of the body." (Baldwin, 1890, p.244)

Theoretical explanations of the geometrical optical illusions fall into two categories--peripheral and central (Ladd & Woodworth, 1911). Of the peripheral theories, the eye-movement theory is probably the most important. Central theories, which assume that illusions are caused by processes in the brain, rather than in the receptor organs, are of three general types. Perspective theories state that simple line drawings can suggest three dimensions, making some parts of the figure appear more distant than others. Dynamic theories suggest that the inner activity of the observer is projected onto the figure to distort its appearance. Confusion theories propose that the observer has difficulty in isolating the parts of the figure to be judged. These theoretical approaches will be discussed in more detail later as they relate to the Müller-Lyer illusion. Visual illusions played an important role in the development of Gestalt psychology, which said that the perception of visual space is determined not just by the retinal image, but also by field forces which organize afferent stimulation when it reaches the brain (Koffka,

1935). The early Gestalt theorists relied heavily on optical illusions to provide support for their postulate of dynamic organization of the visual field in perception. Illusory phenomena illustrate how form and pattern perception may be partly independent of the stimulus. Geometrical optical illusions show the influence of context in visual organization, since the same stimulus in different contexts can appear quite different.

As a result of this interest in illusions, numerous theories were postulated to explain why they occur. New illusions were found, and variations of older ones were created in order to support one theory or another. In view of the vast literature on perceptual illusions in the scientific journals of that time, it is worthy of note that little data was actually collected. Arguments concerning the applicability of specific theories to various forms of an illusion figure largely replaced empirical evidence.

We now turn from general considerations of illusions, and discuss the specific illusion with which this thesis deals.

Discovery and Early Theories of the Müller-Lyer Illusion

The Müller-Lyer illusion was discovered in 1889 by F. C. Müller-Lyer (1889). The most common form of the illusion pattern consists of a straight line to which oblique lines are attached, as shown in Figure 1. The illusion involves an underestimation of the extent bounded by inward-turned obliques (left half of Figure 1) and an overestimation of the part bounded by outward-turned obliques. There are a number of variations of the Müller-Lyer figure, but all

produce a similar illusory effect.

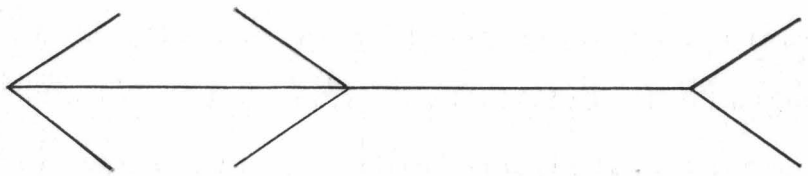


FIGURE 1. The Müller-Lyer Illusion

In most early experiments the method of adjustment was used to measure the magnitude of the illusion. In this procedure the part of the figure enclosed by the inward-turned obliques (referred to as the "standard" part of the figure) is drawn with black ink on a stationary white card. The remainder of the figure is drawn on another white card, which is movable, and extends behind the card with the standard part. The observer adjusts the movable card until the two horizontal extents of the figure appear equal in length. The amount of error is measured from a scale on the back of the apparatus. The illusion is present if the adjustable part of the figure is set shorter than the standard.

The Müller-Lyer illusion is one of the best known visual illusions, and a great deal of attention was focussed on it during the two decades following its discovery. It was used to test most of the early theories about illusions, and as a result, more than a dozen theoretical explanations of this illusion were formulated.

Because of the vague and incomplete nature of most of these theories it is practically impossible to make and test experimental predictions. Since most of these theories are not of primary relevance to the problem of this thesis, they will be dealt with only briefly. More detailed description and discussion of them can be found in Boring (1942), Ladd and Woodworth (1911), and Titchener (1901). The following discussion is based on these secondary sources.

The peripheral theories of this illusion are: Wundt's eye-movement theory, Heymans' tendency to eye-movement, Delboeuf's attraction of regard, and the dispersion image theory of Einthoven. The first three of these are based on the assumption that eye-movements are restricted over the standard part of the figure and extended beyond the ends of the horizontal extent in that part of the figure with outward-turned obliques. If this were the case, the eyes would move through a greater distance when the observer is inspecting the part of the figure with outward obliques than when he is inspecting the standard half of the pattern. Feedback from eye muscles is assumed to provide a cue for judging the length of the lines. The other major peripheral explanation, Einthoven's theory, was based on blurring of the retinal image, which makes it difficult to determine exactly where the horizontal extents end.

The majority of the early theories postulated some kind of central process to account for the illusion. A perspective theory was proposed by Thiéry and a dynamic theory by Lipps. Some explanations involved the overestimation of acute angles (Brentano and Jastrow). The result of this misjudgment is that the apexes of the angles in the

standard part of the figure appear closer together, and those in the other half, farther apart, than they actually are. Pearce (1904) postulated a "law of attraction", involving an imaginary force of attraction between the horizontal and the oblique lines, to explain this illusion. Gestalt psychology considered the Müller-Lyer illusion to be an example of perceptual organization. The Gestalt law of Pragnanz states that there is a tendency for forms to appear symmetrical or regular. For example, if one saw the inward-turned obliques of the Müller-Lyer figure as forming a diamond, there would be a tendency to bring the obliques together to complete the diamond shape, decreasing the apparent length of the horizontal line.

Since one type of central theory, "confusion" theory, is directly relevant to the interpretation of the results which follow, those interpretations which fall into this category are now considered in more detail. The first of these was put forth by Müller-Lyer (1896), who explained the illusion by the principle of "Konfluxion", suggesting that when two mental processes are set up by neighboring stimuli, they may influence each other in the direction of greater likeness (confluence) or of exaggerated difference (contrast). In estimating the two sides of the figure, one involuntarily takes into account spaces included by the oblique lines. The line bounded by inward obliques thus appears shorter, the other one, longer than it is.

Láska's theory of joining the discontinuous is based on the notion that judgments are influenced by both habitual tendencies and present stimulation. In this case the tendency is to join a discontinuous figure. The line necessary to make a complete figure of

that part with outward obliques is longer than that required to complete the enclosed portion. Therefore the former appears longer.

A third explanation of this type, Brunot's "mean distance" theory, suggests that judgment is based on the average distance between the arrowheads formed by the oblique lines, that is, between the "centres of gravity" of the terminal spaces. These centres of gravity are closer together in the standard part of the figure than in the part with open obliques.

The importance of viewing the entire figure is emphasized in the next two confusion theories. Auerbach stated that, in estimating the divided horizontal line, the eye involuntarily imagines lines drawn parallel to it, joining the end oblique lines. Since the centre oblique divides these imaginary lines unevenly (the parts of the side with the inward obliques being shorter), the horizontal line of the illusion figure also appears to be divided unevenly in the same manner.

Schumann explained the illusion by the principle that one judges from the total impression of the figure, rather than from a single element. The total impression is greater than that of the horizontal line in the part bounded by outward obliques.

It can be seen that the theories involving the concept of confusion or distraction of attention from the horizontal line emphasize the difficulty of isolating the features of the figure that are to be judged. In making this judgment, it is easier to take the arrowheads as units and judge the distance between them

than to isolate the exact points which mark the ends of the distances to be compared. Several of these accounts are based on the total impression of the figure as the main source of error. These include the theories of Auerbach, Brunot, Delboeuf, Einthoven, Laska, Müller-Lyer, Schumann, and Wundt. The same reasoning is followed by Ladd and Woodworth (1911), who conclude their discussion of geometrical illusions by asserting that they are chiefly due to central processes, and that these are bound up with tendency to perceive figures, and compact parts of figures as wholes.

It is indeed difficult to choose among those theoretical explanations of the illusion, especially in view of the lack of empirical evidence. Some of the criticisms made of these theories during this period of their popularity will be cited in order to indicate the kinds of evidence which were used to assess their validity.

Many theories were attacked simply by demonstrations of their inability to explain particular variations of the Müller-Lyer figure. Those based on overestimation of acute angles (Brentano and Jastrow) have been called invalid since the illusion is still quite strong when the end lines, instead of being at an angle, are perpendicular to the horizontal line, with short lines parallel to it, like two-pronged forks (Heymans, 1896). Eye-movements were considered to be unnecessary, since the illusion occurs when the figure is presented tachistoscopically for intervals too brief to allow such movements (Lewis, 1908). Explanations based on apparent extension of the horizontal line and on attraction of regard to or

from this line have been criticized because a strong illusion is present when the horizontal connecting line is omitted from the figure (Piéron, 1911).

Although it was stated earlier that little evidence was collected in support of the various early theories of the Müller-Lyer illusion, this does not mean that experiments were not done. A few investigators put a great deal of effort into studying the parameters of the illusion, but most of their data are not relevant to the theoretical explanations, as will be seen in the following section which deals with the early experiments that investigated the variables influencing the magnitude of the illusion.

Early Studies

Magnitude of Illusion

Several of the variables which determine the magnitude of this illusion were studied within the three decades following its discovery. One of the most important and extensive early investigations was conducted by Heymans (1896). In a series of experiments he studied the effect of length and angle of the oblique lines on the magnitude of the illusion. He found a decrease in the illusion as the angle between the obliques increased. From this finding he derived the "cosine law", which states that the average illusion divided by the cosine of the angle is a constant. This relationship did not hold strictly, since there was an increase in this ratio as the angle increased.

With angle between the obliques and length of the horizontal line held constant, magnitude of the illusion was found to increase as length of the obliques increased. However, a maximum point was reached beyond which the illusion began to decrease. This maximum point was also a function of the angle between the oblique lines, increasing as the angle increased.

Measuring the two parts of the figure separately, Heymans found a greater illusion in that part with outward-turned obliques. He also noted that the illusion could be reduced by having the subject judge the figure in a series of successive trials. He did not, however, attempt a systematic investigation of this practice decrement.

Lewis (1909) also studied the influence of length and angle of the oblique lines. His experiments differed from those of Heymans in that the subjects judged the two parts of the illusion figure separately. The maximum law (relating magnitude of the illusion to length of the obliques) was found to apply for angles of 36 and 72 degrees, but not for larger angles. He showed that the illusion decreases systematically as the angle is increased, confirming Heymans' results. All these findings held for conditions of prolonged as well as momentary viewing (.02 seconds) of the figure, but the illusion was stronger under the latter condition. However, since no more than two subjects were used in any one experiment, the generality of Lewis' results may be questioned.

Lewis accounted for the maximum law in terms of confluxion and contrast. He suggested that with shorter oblique lines the horizontal line appears to be assimilated by them, making the two

halves of the figure look longer or shorter than they actually are. With longer obliques, a contrast effect comes into play, and the total length of the figure appears obviously much greater than that of the horizontal line alone. The result is a reduction of the confusion between the whole figure and a part of it, and the illusion is weakened, since the part to be judged (the horizontal extent) is easier to isolate from the total figure.

Piéron (1911) also demonstrated the maximum law. All three investigators (Heymans, Lewis, Piéron) found that the maximum illusion occurs when the obliques are about 40% as long as the horizontal segment in the standard part of the figure. In another investigation of this relationship, Scripture (1905) failed to establish a maximum value for the illusion while varying the obliques up to 60% of the length of the horizontal. Some investigators were able to confirm Heymans' finding that the magnitude of the illusion is inversely related to the angle between the obliques (Scripture, 1905; Van Biervliet, 1896), while another (Piéron, 1911) found a maximum value of the illusion at intermediate angles.

Benussi (1904) made an important contribution in support of the confusion explanation of the illusion. He showed that a prominent horizontal line breaks up the total figure, making it easier to isolate the part to be judged, thus weakening the illusory effect. He varied the brightness difference between the horizontal and oblique lines, and found (using a black background) that the greatest amount of illusion was produced when the figure consisted of a dark gray

horizontal line and white obliques. The illusion was least with the opposite combination, a white horizontal and dark gray obliques. In the latter configuration, the horizontal line was very conspicuous. Other combinations of white, light gray, and dark gray produced illusions of intermediate magnitude. These results held whether the subject was instructed to view the figure with a whole-perceiving or a part-perceiving attitude. However, the illusion was much greater when the former attitude was adopted. This illustrated the importance of the total impression of the figure in producing these errors.

On the basis of the experiments reviewed up to this point it appears well established that an inverse relationship holds between the magnitude of Müller-Lyer illusion and the size of the angle between the oblique lines. In addition, most of the findings support the conclusion that the illusion's magnitude increases at first, then decreases, as the length of the oblique lines is progressively increased.

The Practice Decrement

We shall now consider the decrement in the magnitude of the illusion which occurs when the subject judges the figure a large number of times. Historically, these early experiments are of particular importance, since practically all of the recent work on the illusion has dealt with the practice decrement.

Although Heymans (1896) noted the influence of practice on the illusion, Judd (1902; 1905) was the first to systematically study

this variable. His subjects, without knowledge of results, judged the figure a predetermined number of times each day for several days. After nearly 1,000 trials, the illusion disappeared for the two subjects used. Judd (1905) made a careful examination of his subjects' eye-movements by the use of photographs, and concluded that, although the illusion probably has a sensory-motor basis, the eye movement hypothesis is not adequate. He found restricted eye-movements over the standard part of the figure and relatively free movements over the other portion. This was contradictory to what was known about the perception of filled and unfilled space. It was believed that filled space is perceived to be longer than the same extent of unfilled space because of the greater restriction of eye-movements in the former. From this it follows that the restricted eye-movements associated with inspecting the standard part of the figure ought to cause an overestimation, rather than an underestimation of that extent. Judd also found that after the illusion had been overcome, a reversal of the figure (180 degree rotation) could bring the illusion back to nearly its original strength, although it was rapidly overcome by further practice.

Judd (1902) discovered that a large number of practice trials (750 or more) with one configuration of the illusion influenced later judgments of a different configuration. His data indicated a transfer of training from a figure with a 45-degree angle between the obliques to another with a 90-degree angle. Similarly, practice with a 90-degree figure carried over to practice with a 45-degree figure. Transfer also occurred from one figure to another with longer obliques,

as well as from practice with a figure in one orientation to the same figure rotated 90 or 180 degrees.

Lewis (1908) found that under conditions of momentary exposure, some subjects show a practice decrement, while others show an increased illusion over trials. Under prolonged viewing, however, all subjects show a substantial decrement. Lewis suggested as an explanation that the horizontal line becomes more prominent with practice, leading to a decrement in the strength of the illusion. He thought of the practice decrement as an active process, for he stated that "... the illusion does not disappear when the subject ceases to exert effort to overcome the distraction caused by the oblique lines." (Lewis, 1908, p. 300). More efficient restriction of attention to the horizontal line is the main cause of the practice decrement, according to this author. Judd's (1905) data, showing that eye-movements become more systematic with practice and that fixations become restricted primarily to the areas where the oblique lines join the horizontal line at the extremeties of the figure, are cited by Lewis as supporting evidence.

Seashore, Carter, Farnum, and Sies (1908) also studied the practice effect. They found a decrement in the magnitude of the illusion when trials were administered over periods ranging from 12 to 35 days, with 40 trials per day. They also demonstrated that knowledge of results facilitates this improvement with practice. Complete recovery of the illusion was evident in two subjects who were tested two years after the original training.

Ladd and Woodworth (1911) argue that the decrement of the

illusion with practice may consist of overcoming the confusion between the horizontal and the oblique lines, even though the observer does not know that his errors are changing. "The probable explanation of this practice effect is that the observer is conscious of the difficulty of isolating the feature to be judged, and therefore devotes himself to this isolation. The skill which he thus acquires in thrusting aside complicating features of the figure is in part a specific aptitude in dealing with a particular figure, and may not be transferred promptly to another figure or even to a changed position of the same figure; yet facility in dealing similarly with another figure is more easily acquired because of the previous practice." (Ladd & Woodworth, 1911, p. 451)

Criticisms of Early Research

Although the research cited above indicates some consistency in the general conclusions, there are marked variations in the specific quantitative results reported by different authors. This may very well be because the early research on the Müller-Lyer illusion does not meet current standards of design and analysis. The number of subjects tested was often too small to permit any degree of generalization of results, and important variables were left uncontrolled. For example, few investigators controlled for the orientation of the figure in the visual field, a control which Brown (1953) points out is essential because of the inhomogeneous properties of visual space in different parts of the visual field. Biases in the judgment of the figure are also associated with the particular

psychophysical procedure used in some experiments. Parker and Newbigging (unpublished manuscript) showed that decrement of the illusion occurs only when shorter settings or randomly intermixed longer and shorter settings of the variable part of the figure are used in presenting the illusion. In their experiment, setting the variable component always longer or at physical equality at the beginning of each trial did not lead to a practice decrement in 96 trials.

As an example of the unsophisticated procedures used we can consider Heymans' (1896) experiment, which is usually cited as the source for the influence of length and angle of the oblique lines on the magnitude of the illusion. He used some of his subjects in a number of experiments, without taking into account the transfer of learning from one experimental task to another, an important procedural point, since a practiced subject will be less susceptible to the illusion than will a naive one. In addition, he never had more than 36 observations per group in any of his experiments. It is difficult to tell whether this represents 36 trials by one subject, 6 trials by 6 subjects, or 1 trial by each of 36 subjects.

For these reasons the precise relationship between the magnitude of the Müller-Lyer illusion and such variables as length and angle of the oblique lines and amount of practice cannot be considered firmly established. In particular, how these different variables interact to determine the strength of the illusion is not evident from early investigations.

The experiments described so far are those early studies

which are closely related to the problems of this thesis. Many other variables of incidental importance, such as figure size, age, intelligence, and culture have also been studied. In the interest of historical completeness these will be described before the more recent work which is closely related to the problems in question is discussed.

Miscellaneous Studies

Of the experiments to be described in this section, the majority were conducted after the initial period of interest in the Müller-Lyer illusion (that is, after 1911). Size of the illusion figure has attracted the attention of a number of investigators. Heymans (1896) found a slight inverse relationship between strength of the illusion and figure size. Similar results were obtained by Binet (1895) and Piéron (1911). The latter investigator found an unexpected decrease in the magnitude of the illusion when the figure was very small (5 mm. standard).

A cross-cultural study by Rivers (1905) indicated that English subjects were more susceptible to the illusion than were those in certain primitive cultures. It has been suggested that this difference is due to differential familiarity with geometrical forms. More recently, Segall, Campbell, and Herskovits (1963) found similar results from a sample of 15 cultures. They explained this by saying that perspective cues in the illusion figure have little meaning for subjects who do not live in an orthogonal environment.

Intelligence is unrelated to susceptibility to this illusion

according to Crosland, Taylor, and Newsom (1927; 1929). Judgment of the length of a line can be influenced by arrowheads which are of subliminal intensity (Bressler, 1931; Kennett, 1962).

The Müller-Lyer illusion can be thought of as a combination of two effects -- the tendency to overestimate a space bounded by outward obliques, and the tendency to underestimate a space bounded by inward obliques. The error of overestimation is greater than the error of underestimation (Heymans, 1896; Lewis, 1909). It is not known how these effects combine to produce the illusion seen in the configuration with the two parts combined (Figure 1). Only two authors appear to have examined this. Binet (1895), using children as subjects, found that the magnitude of the illusion in the complete figure was less than what would be expected from adding the amount of illusion produced by the two component parts. Pieron (1911) reported the opposite. His subjects had an average illusion of 21.6% (error of overestimation) and 13.5% (error of underestimation) on the two parts of the figure. The average illusion with the complete figure was 39.2%. This was greater than the 35.1% which would be expected if the effects combined in an additive manner.

Andrews and Robinson (1948) reported a negative time-error in judging the illusion by the method of constant stimulus differences. The variable part of the figure followed presentation of the standard by 0, 1, 3, 6 or 20 seconds. The subjects' task was to indicate whether the variable appeared longer or shorter than the standard. Magnitude of the illusion increased as time delay increased up to 6 seconds, then it decreased at 20 seconds.

Two experiments have demonstrated that the Müller-Lyer illusion is present in subhuman species. Warden and Baar (1929) found that the Ring Dove was susceptible to the illusion. Although their procedure did not allow for measurement of the magnitude of the illusion, they felt it was quite strong. A short time later, Winslow (1933) found that chicks were susceptible to four illusions, including the Müller-Lyer. He concluded that, since the chick does not have binocular vision, perception of the illusion is not dependent on this.

Investigations of the influence of age on the magnitude of the illusion generally show that children are more susceptible to the effect (Printner & Anderson, 1916; Walters, 1942). Walters also found that variability in the judgment of the illusion decrease with age. In his review of developmental studies in perception, Wohlwill (1960) reports that practically all relevant investigations find a decrease in the illusion with age.

Piaget and his associates (Piaget, 1961; Piaget & Lambercier, 1950; Piaget and von Albertini, 1950) have devoted much time to the study of illusions in children. Piaget's concept of "centration" has been applied to the decrement of this illusion with age. Centration, the tenency to center attention on one part of a stimulus while ignoring the rest, leads to overestimation of the stimuli in the centre of the attentional field. This tendency decreases, and the amount of perceptual activity associated with the figure increases with age, resulting in more veridical perception. Piaget (1961) also studied the illusion in adults, com-

paring it to judgment of the parallel sides of a trapezoid, in which the longer side is usually underestimated and the shorter side overestimated. Increasing the relative lengths of the oblique lines of the Müller-Lyer figure and the trapezoid figure, he found similar results for both--an increase in error up to a point, then a decrease as the obliques are lengthened. His results were similar to those of Heymans (1896).

A physiological explanation of this illusion, based on the phenomenon of retinal induction, has been proposed by Motokawa (1950; 1962). He discovered that an optical image on the retina produces a "field of induction" in the surrounding retinal area, and that this field could be mapped by determining the excitability of the area surrounding the image. By field of induction he meant the physiological spreading of the effect of local illumination to the retinal areas near that on which the image falls. The effects of these associated electric fields can influence information transmitted to the central nervous system. Amount of induction was shown to be directly related to the degree of contrast between figure and ground. The contrast effect is greatest close to the retinal area being directly stimulated. A gradient of decreasing contrast was established at points more and more distant from the stimulated area. This is normally a steep, continuous gradient.

Motokawa (1950) found that the field of induction along an imaginary extension of the horizontal line (beyond its junction with the outward obliques) in the Müller-Lyer figure shows a conspicuous discontinuity or sharp drop in the gradient of the field at some

distance from the end of the line itself. In the case of the part of the figure with inward-turned obliques, there is a similar discontinuity inside the arms of the arrowheads. It has been shown that if the oblique lines are very long, relative to the length of the horizontal line, the illusion is weak (Heymans, 1896; Lewis, 1909). The corresponding induction field in such a figure shows no discontinuity in the gradient as in the case of figure with obliques of intermediate length. The gradient at these points of discontinuity is nearly as steep as the gradient produced by the real edge of a stimulus figure. Motokawa suggests that this property of the retinal field could easily give rise to the sensation of an apparent edge at the site of the discontinuity in the induction gradient.

Working with the eye of a carp, Motokawa (1962) was able to show electrical fields about the Müller-Lyer figure on the retina which were similar to those he had found in humans. The retinal area having positive polarity was larger for that part of the figure with outward obliques than for the other part. He suggests that this may be the reason why the former appears longer than the latter. This finding does not, however, appear to explain why the line bounded by inward obliques appears shorter than it is.

Although Motokawa's findings are impressive, they have not escaped criticism. Gebhard (1953) reviewed his work, indicating the dearth of data reported in support of the theory and the great amount of training his subjects had before these results were obtained. Ogasawara (1958) points out that Motokawa says the illusion may be

due to a vague sensation of an apparent edge. This critic objects to the use of the concept of a vague sensation which he says is scientifically meaningless simply because of its vagueness.

Heron, Morrison, and Bartlett (1962) have provided evidence of cortical activity associated with stimulation by the illusion pattern. While recording from single cells in the striate cortex of the cat, they passed the pattern in steps over that part of the retina which produced firing in the cell. During the stimulation the pattern was moved rapidly back and forth. The authors argue that these movements of the stimulus were very small, and of the same magnitude as those which would be produced by the normal physiological nystagmus of the cat. They were able to demonstrate that the rate of firing in the cell is maximal when the receptive field is stimulated by parts of the figure some distance inside the angle formed by the obliques, rather than at the apex. From this they concluded that the physiological basis for the illusion may be "... the gradients of excitability established in the visual system by the stimulus pattern." The discrepency between the points of the figure producing maximum stimulation and the points which are to be judged could be the source of distorted perception. They also reported a decrease in the displacement of the point of maximum firing as the angle between the obliques is increased. This relationship was found to fit very closely with predictions based on Heymans' cosine law (Heymans, 1896). It is difficult to say just how these findings relate to the appearance of the illusion figure. Their technique of passing the illusion pattern over the receptive field

of the retina would be expected to produce maximum firing in the cell at greater distances from the apex as the angle between the obliques is diminished. As the entire pattern is moved across the retina, the arms of a small-angled figure would come into the receptive field at a greater distance from the apex of the figure than would the arms which formed a large angle. In addition, it is not known whether the cat experiences the illusion nor whether the cells in the cat's cortex respond in the same way as do those of humans.

Recent evidence of eye-movements associated with the illusion has been presented by Yarbus (1954). He showed that the eye-movements are longer when inspecting the normally overestimated half of the figure than when inspecting the other half.

Obonai (1935) has attempted to explain the Müller-Lyer illusion by his law of psycho-physical induction. "This law says that in an area closely adjacent to a stimulated point, a contrast effect (underestimation) predominates, and with an increase of the space interval a phase of assimilation (overestimation) sets in. Such a theory would obviously lead to an explanation according to which the underestimation of the inward-turned diagram of the Müller-Lyer illusion is due to the contrast effect, while the overestimation of the outward-turned diagram is due to the assimilation effect. The reason for this is that the inward-turned lines imply a closer adjacency of the inducing (influencing) part to the central induced part, and the outward-turned lines, in their turn, imply a remoteness from the central part." (Obonai, 1935, p. 39) He found that

the magnitude of the illusion decreases as the size of the figure increases, in the same way as do the contrast illusion and the filled-unfilled space illusions. He argued that all three are manifestations of the same underlying mechanism. The other two illusions had previously been explained by Obonai in terms of psycho-physical induction.

Oyama (1960) provides an extensive coverage of the Japanese work on optical illusions in a recent review of the subject. The most relevant of these studies have already been discussed.

The review of the Müller-Lyer literature to this point has dealt with the experiments of primary interest up to about 1911, as well as with the various investigations of tangential interest up to the present. Following the initial surge of interest in this illusion just after its discovery, little work of theoretical importance was done until 1950. This lack of concern probably occurred because the early investigators appeared to have exhausted the theoretical explanations of the illusion and its practice decrement. It was the physiological theorizing of the Gestalt psychologists which drew attention to the illusion once again.

Recent Interpretations of the Practice Decrement

It will be recalled that early explanations of the decrement of the Müller-Lyer illusion with practice were based on the assumption that the subject gradually overcomes the distracting

influence of the oblique lines (Ladd & Woodworth, 1911; Lewis, 1908). These interpretations treated this perceptual change as a learning process. Köhler and Fishback (1950a; 1950b), objecting to the learning explanation, proposed an alternative account based on physiological changes in the brain. A controversy soon arose over which interpretation could best account for this phenomenon. The first interpretation to be formulated in detail was based on the theory of figural after-effects (Köhler & Wallach, 1944). It was challenged a few years later by several investigators who considered the practice decrement to be a learning process. The figural after-effects explanation will be discussed first, followed by the accounts of those who favor a learning interpretation.

Satiation Interpretation

This formulation, derived from the work of Gestalt psychology, is based on the concept of "satiation" or chemical changes in the brain tissue. The theory of figural after-effects, as developed by Köhler and Wallach (1944), came from an extension of Gibson's (1933) finding that a slightly curved line in the vertical position appears less curved after being inspected for 5 to 10 minutes. A straight vertical line viewed in the same way immediately after this appears to be curved in the direction opposite to that of the original line. The first phenomenon was called adaptation, the second, negative after-effect. An extension of the work based on these phenomena led to a physiological explanation of the practice decrement in the Müller-Lyer illusion (Köhler & Wallach, 1944; Köhler & Fishback, 1950a; 1950b).

The theory from which this arose will now be summarized.

The satiation theory, or figural after-effects theory, is based on the belief that specific processes in the visual area of the brain are associated with the presence of a figure in the visual field, and that these processes gradually change the tissue medium in which they occur. Köhler and Wallach (1944) demonstrated that the appearance of a figure would be distorted if it were seen following prolonged stimulation of the retina. They had subjects inspect an outline figure (e.g., a rectangle) for a few minutes by fixating a mark to the right of the figure. Immediately following this the subject was required to look at an identical figure in the same manner, but beside this "test figure" and on the opposite side of the fixation point another identical figure was added. The two identical patterns did not have the same appearance. The pattern coinciding with the previously inspected figure appeared paler, farther away, and sometimes smaller than its partner.

This effect was explained in terms of electrotonus or satiation. According to the theory, all visual figures are accompanied by cortical figure currents, a flow of electric current around the border between areas of different brightness. These currents produce electrotonus, a polarization of all cell surfaces through which they pass. A gradual change in the polarizability of these cells results, setting up an increased resistance in the brain tissue affected. The effect is to alter the current from incoming visual impulses, shifting it to an area of less resistance. The resulting visual experience is a change in the brightness, apparent depth, location, or size of the

figure being viewed. According to the Gestalt principle of isomorphism, a stimulus figure is represented on the visual cortex in such a way as to preserve the geometrical distribution of the retinal activity (Koffka, 1935). The cortical areas stimulated by the oblique lines of the Müller-Lyer pattern would be in the shape of a V, just as are the oblique lines themselves. As the figure is inspected, satiation is built up at a greater rate within the arms of the V than in front of its apex. This causes a displacement of the lines forming the V in a direction away from the area of greatest satiation. The lines forming the inward-turned obliques would thus be gradually displaced away from each other, while those forming the outward-turned obliques would be displaced toward each other, decreasing the illusory effect. This was Köhler and Wallach's explanation of the decrement in the illusion with practice. They provide supporting evidence for this explanation, showing that there is a greater amount of satiation built up in the area between the inward obliques than between the outward obliques. They demonstrated this by having subjects fixate the illusion pattern for a time. A subsequently presented square falling on that part of the retina bounded by the inward obliques appeared farther away and smaller than an identical square falling between the outward obliques.

Köhler and Fishback (1950a; 1950b) elaborated this theory, and carried out a number of experiments to test the satiation hypothesis as it applies to the practice decrement of the Müller-Lyer illusion. They interpreted their results as confirmation for this hypothesis, and refuted the notion that the decrement is a learning

process. They report that if a subject just fixates the illusion pattern for a length of time, the effect is reduced by one-half. After the illusion was destroyed, it was found to be absent only in that part of the brain on which the pattern had been projected. In the tachistascopic procedure used by Lewis (1908), there was very little decrement in the illusion with practice. Kohler and Fishback suggest that this was because there was not time for satiation to build up at such short exposure durations (.02 seconds). A further finding reported by these workers was that massed practice with the illusion results in a slower rate of decrement than does distributed practice. They claim that this happens because satiation is built up in the "wrong" places, in front of the apexes formed by the obliques. When satiation here becomes as strong as that between the arms of the angles, the illusion will no longer decrease with further fixation; it may even begin to increase.

According to the satiation theory, an important factor in determining the decrement in the illusion is the length of time available for satiation to build up. Amount of decrement should be related to the length of exposure to the figure. If this is the case, then simply fixating the pattern ought to decrease the illusion. Köhler and Fishback (1950a) and Selkin and Wertheimer (1957) report that this is the case. However, Azuma (1952) failed to find any effect on the illusion under these conditions.

Köhler and Fishback (1950a) point out three findings which they say cannot be understood in terms of learning. (1) There is a decrement in the illusion without knowledge of results. (How can

learning take place under such conditions?) (2) The illusion returns, when the figure is rotated 180 degrees. (3) After practice some subjects finish with a negative illusion. (If it is a matter of learning, improvement should stop when the error has been eliminated.)

Woodworth and Schlosberg (1954, p. 423) have replied to these criticisms of the learning explanation. They suggest that the subject sees the task as a difficult one, so he examines the figure carefully and adopts a different, probably more analytical, approach to it. It is this change in the method of judging the figure, rather than knowledge of results, that is important, according to these authors. Concerning the second objection, they say that the subject becomes habituated to a particular orientation of the stimulus. This habitual way of judging the figure interferes temporarily with the perception of the stimulus in a different orientation. Judd (1905) had previously attributed this to the strongly established habit of specific eye-movements, which had to be overcome before the stimulus in its new orientation was inspected in the same manner. Negative illusions could be the result of trial to trial variations which are present in all subjects. When the average error is zero, it is sure to be negative on some trials. This could be particularly important with small numbers of subjects, as many workers, including Köhler and Fishback, had used. In addition, the subject may overdo his analytic attitude toward the figure.

Although the proponents of the satiation hypothesis have provided some impressive demonstrations of figural after-effects, a great deal of evidence has been marshalled against this theory. Inconsistencies between experimental findings and the theory have been pointed out by Hebb (1949), Jaffe (1954), Luchins and Luchins (1953)

and Spitz (1958). Convincing physiological evidence against this theory of brain functioning has been provided by three experiments in particular. Lashley, Chow, and Semmes (1951) placed gold foil conductors on the surface of the cortex and gold pins into the striate cortex of monkeys. This failed to affect a previously learned visual discrimination task. Sperry and Miner (1955) inserted dielectric material (mica plates) into the visual cortex of cats. In another experiment (Sperry, Miner, & Myers, 1955), cuts were made in random patterns in the visual area of the brain. Neither of these procedures had any influence on visual discrimination tasks which had been learned prior to the operations.

If electric currents in the brain act as the satiation theory says, these procedures should have imparied previously learned visual skills. The gold foil conductors should have altered the pathways of the currents, making it impossible to recognize a familiar stimulus. Mica plates and cuts in the cortex ought to have impaired the flow of electric currents.

In view of the present knowledge of the physiology of the nervous system, it seems unlikely that the brain functions as Kohler and his associates had thought (Hebb, 1949; Osgood, 1953). In addition to these general criticisms of this approach, a number of studies of the Müller-Lyer illusion have failed to bear out predictions made on the basis of the satiation theory. These and other experiments dealing with the practice decrement

of the illusion as a learning process will now be discussed.

Learning Interpretations

Working from the assumption that the practice decrement is a learning phenomenon, Day (1962) predicted that central fixation of the figure would produce greater decrement than would eccentric fixation. His results support this prediction. He proposed that any condition which allows easy comparison of the two horizontal extents in the figure will facilitate the practice decrement. One further experiment by the same author is also relevant to the issue of fixation in viewing the figure. Day argued that a change in the fixation point after the figure had been judged a number of times would cause an increase in the illusion if satiation is the mechanism at work. He found no effect when he changed the fixation point after 60 trials. In fact, he found no decrement in the illusion at all.

A question arising from the satiation interpretation is whether fixation of the figure during judgment is more effective in reducing the illusion than free inspection of the figure. The figural after-effect hypothesis requires continuous stimulation of the same parts of the retina in order for satiation to built up. Fixation would permit this, whereas free inspection would make the stimulus fall on different parts of the retina, causing satiation to be established more slowly, if at all. Faster decrement of the illusion would be expected with the fixation procedure. Mountjoy (1960b) found no decrement using the fixation technique. Day (1962) studied the variable of figure size under conditions of fixation and free

inspection. The latter condition produced a smaller illusion than fixation, and led to a substantial decrement over 50 trials. Under the fixation condition, decrement occurred only with the smaller of two figures. An interaction effect indicated that the smaller figure produced less illusion when inspected freely, but greater illusion when fixated. Selkin and Wertheimer (1957) found the same rates of decrement with both fixation and non-fixation.

Day also studied the influence of different kinds of activity interpolated between two judgements of the figure. During a two-minute interval between successive trials, he had subjects either fixate the centre of the figure, fixate a dot on a white screen, or close their eyes. All three procedures resulted in similar amounts of decrement in the illusion. This suggests that the decrease here is not due to satiation, otherwise the first activity would have produced greater decrement.

Azuma (1952) also studied the effect of interpolated tasks on changes in the illusion. The magnitude of the illusion in one part of the figure (that half with outward obliques) was measured before and after subjects performed a task for 12 to 20 minutes. The interpolated tasks which decreased the illusion were: repeating the adjustment many times with the same figure, looking for small dark spots presented one by one on different parts of the original figure, drawing the figure many times on paper, repeating the original task, but with the part of the figure with inward obliques, and looking for small dots on this half of the figure. Ineffective tasks were: fix-

ating the centre of the figure and looking for small dots presented on the original figure where the oblique lines meet the horizontal. Azuma concluded that existence of satiation may not always be a necessary or satisfactory condition for bringing about a decrease in the illusion. He postulated an intervening variable that is determined by experience with some aspect of the percept. The careful observation of the stimulus figure which is effective in producing a decrease Azuma calls "the effect of experience."

Moed (1959) reports results that are contradictory to the satiation theory. He found no difference in the amount of decrement of the illusion under conditions of symmetrical and asymmetrical satiation. The theory says that only the latter causes displacement of a percept. Under one experimental condition he had subjects view the illusion figure in the same orientation throughout a series of trials in order to produce asymmetrical satiation. Under the other condition, subjects viewed the figure on alternate trials in one orientation and then the other (rotated 180 degrees). According to the figural after-effects hypothesis, the satiation effects should cancel each other out in the latter condition. With the arrowheads in one orientation, satiation would build up most quickly in those parts of the brain corresponding to the inside of the angles, causing subsequent visual impressions to be displaced in the direction in which the arrowheads point. When the figure is rotated 180 degrees, maximum satiation is then built up in those parts of the brain corresponding to the areas in front of the first arrowheads. As the

figure is rotated on alternate trials, satiation is built up on both sides of the apexes (symmetrical satiation), rather than on just the inside (asymmetrical satiation), as when the figure is always in the same orietation. If the satiation explanation is correct, the symmetrical satiation about each arrowhead would not alter the flow of current produced by the stimulus pattern. There should be no decrement in the illusion when the pattern is viewed in alternate orientations. However, Moed found a substantial decrement under both conditions. Another predication tested by Moed in the same experiment was that decrement of the illusion would be the same whether the subject was given a large number of brief exposures to the figure or a small number of long exposures. Approximately the same amount of decrement did occur in both cases.

In an investigation of the effects of brightness on the destruction of the illusion, Kamin (1959) found that under "low" intensity there was a greater illusion than under conditions of "medium" or "high" intensity. However, she found no difference in the rate of decrement under these conditions. Interpreting these results according to the satiation hypothesis, she suggested that satiation may have proceeded very rapidly under the two higher intensities, and so reached some asymptotic level within the first block of 24 trials, attenuating any differences in the rate of decrement under the different conditions.

Köhler and Wallach (1944) noted the resemblance between figural after-effects and illusions, suggesting that some geometrical illusions may be essentially a combination of inspection and test

figures into one. The result of this combination is a displacement of part of the figure. Summerfield and Miller (1955) investigated this possibility as well as the influence of fixation on figural after-effects and illusions. Using the "heringbone" figure (in which straight lines meeting at an angle cause superimposed parallel lines to appear to diverge), they had subjects view the stimulus under four conditions--illusion-inducing element presented just prior to or simultaneous with the parallel lines and under conditions of fixation or non-fixation. The illusion condition (two parts combined) had a greater effect than did the after-effects condition (successive presentation of the two parts). An interaction of the two variables showed that fixation favors the after-effects, while non-fixation favors the illusion effect. These results do not support Köhler and Wallach's suggestion that the same mechanism might underline both after-effects and immediate illusions.

The figural after-effects theory had been used to account for the practice decrement of the Müller-Lyer illusion, but no attempt had been made to explain the occurrence of this illusion by the concept of satiation. Spitz and Blackman (1958) studied the possibility that the occurrence of the illusion is related to satiation. They found that subjects who showed higher degrees of satiation in a test of visual after-effects were more susceptible to the illusion. They interpreted this finding as support for the hypothesis that the initial phase of the satiation process is to some extent responsible for the perception of the illusion.

Many of the experiments on the practice decrement described up to this point have been concerned with renouncing the satiation hypothesis. A number of others have dealt with the variables often studied in learning experiments. Köhler and Fishback (1950b) found that rest periods between sessions will cause the illusion to decrease faster. Mountjoy (1962) reports some spontaneous recovery of the illusion after an interval of 48 hours. This intersession recovery is contradictory to earlier findings of decrement between sessions. A six-month period results in complete recovery of the illusion according to Mountjoy (1962). Seashore et al. (1908) tested subjects after a two-year interval, and found that the illusion was at the original strength.

Mountjoy (1958b) postulated an "habituation" explanation for the practice decrement of the illusion. He argued that if a change in the response to the Müller-Lyer figure is an habituation decrement, it should be related to experimental variables in the same way as are habituatory decrements of other responses. He cites previous research in the field of learning which has shown that greater decrement is related to the massing of trials, that spontaneous recovery is less if there are more habituation trials, and that decrement in habituated responses is a negatively accelerated, decreasing function of the number of trials. Starting with these findings, Mountjoy made analogous predictions about the decrement in the Müller-Lyer illusion. His findings which were interpreted as support for the habituation hypothesis were: a faster decrement with massed practice (1958b), an inverse relationship between number of trials on one day and magnitude of the recovered illusion on the following day (1958b), and

a negatively accelerated, decreasing curve for the decrement (1961a). He concluded that the practice decrement of the Müller-Lyer illusion is not due to figural after-effects.

In an attempt to find out why his results were in conflict with those of Köhler and Fishback, Mountjoy (1961b) varied the size of the visual field in which the subject viewed the figure. His previous experiments had been done with a much more restricted field than that used by Köhler and Fishback. Using two field sizes (10" x 22" and 14" x 31"), he found that both resulted in essentially the same magnitude and decrement of the illusion. It should be noted, however, that both of these fields were quite restricted in comparison with that used by the other investigators, which was apparently bounded only by the walls of the room.

In recent experiments designed to test the adequacy of the various explanations of the practice decrement, Mountjoy (1963b) had five groups of subjects judge different configurations of the pattern, and compared his results with predictions based on five theories--satiation theory and four variants of the learning interpretation. He concluded that Day's (1962) interpretation (that the practice decrement depends upon the ease with which the two horizontal segments of the figure can be compared) most adequately describes the data. Again he states that the practice decrement of this illusion is not an example of figural after-effects.

Eysenck and Slater (1958) object to both satiation and improvement with practice as explanations for this phenomenon. They account for it in terms of habit formation. The subject may, they suggest, be

dissatisfied with his initial setting while the experimenter is writing it down. If so, a reinforcement is provided for a change of the setting in one direction, and an habitual tendency to change may be built up. This change may be toward a decrease in the illusion, in which case the direction taken is downwards and it could continue to become a negative effect. The tendency to change could also be in the other direction, towards a greater illusion. Their results revealed little change in magnitude of the illusion with practice when the data from all subjects were combined. There was a tendency for individual subjects to retain the same direction of change up to the end of 50 trials. These authors also suggest that changes in the illusion could be related to personality factors like the "analytic/synthetic" variable, but that there is as yet no evidence for this.

Rudel and Teuber (1963) found that the magnitude of the illusion was about the same whether the figure was judged visually or by touch, but the decrement was slightly greater for subjects who adjusted the figure by touch. Under conditions of haptic training subjects with larger initial illusions showed more decrement than those whose initial illusion was small.

The influence of monocular perception has been studied by Mountjoy (1960a). He showed that monocular viewing produces a greater illusion than does binocular viewing. No practice decrement occurred under the former condition, but binocular viewing did lead to a significant decrease in the illusion over 30 trials.

Instructions given to the subject in a perceptual task can influence the way in which he makes his judgments. Practically all of the experiments with the Müller-Lyer illusion have employed instructions which direct the subject to judge the figure according to how it appears. As mentioned earlier, Benussi (1904) showed that the illusion could be greatly reduced by instructing the subject to attend closely to the horizontal line being estimated, rather than to view the figure as a whole. Gardner and Long (1961) repeated Benussi's experiment using better controls, and obtained similar results. They conclude that the magnitude of the illusion is determined in part by selectivity of attention.

Day (1962) studied the effect of instructions on the practice decrement. He had subjects adjust the figure to either apparent or physical equality while they inspected the figure freely. There were no differences due to the instructions and no change in the magnitude of the illusion over 50 trials when apparent instructions were given. However, objective instructions did lead to a significant decrement. When a fixation point was used, Day found no difference due to either instructions or practice. These findings are difficult to understand, in view of the number of reports of decrement when apparent instructions are used.

Mountjoy (1965) also varied the instructions to his subjects in an examination of the effects of "self-instruction" and information about the nature of the illusion. He observed that in his earlier experiments some subjects, when questioned after the experimental session, described the illusion as operating in a way opposite to that in which it actually does (saying that the part with inward

obliques looks longer than it is). These subjects failed to show the usual practice decrement. Mountjoy manipulated the instructions to his subjects, describing to one group how the illusion operates, telling another group that it works in the opposite way (as described by the subjects mentioned above), and giving no information to a third group. Correct information led to near zero illusion in less than 25 trials. The misinformed group showed no decrement. Intermediate amounts of decrement were displayed by subjects who received no information about the illusion. Additional motivating instructions to "do your best on each and every trial" did not influence performance.

In the preceding experiment as well as others Mountjoy (1958a; 1958b; 1960b; 1961a; 1961b; 1962; 1963b) demonstrated that there is no relationship between the subjects' sophistication concerning the illusion and the occurrence of a practice decrement or spontaneous recovery between sessions.

Two recent reports of transfer of training lend support to the learning interpretation of the decrement. Mountjoy (1963a) found that practice with a figure having vertical lines instead of arrowheads led to a decrease in the illusion on the following day. Parker and Newbigging (1963) report positive transfer to the Müller-Lyer figure following pretraining with a figure in which circles replaced the arrowheads. Amount of transfer was an increasing function of the number of pretraining trials. They attributed this transfer from the pretraining figure to the Müller-Lyer figure to the "identical

elements" in the two tasks. These findings are comparable to transfer found in other learning situations.

In their comparison of visual and tactual perception of the illusion, Rudel and Teuber (1963) found positive transfer from touch to vision and from vision to touch. Visual to haptic transfer was slightly greater than the reverse. Transfer of training from one perceptual task to another has been found by a number of investigators. E. J. Gibson (1953) discusses these in her review of the improvement of perceptual judgment with practice, and outlines a formulation for understanding perceptual changes which occur with practice.

The Relation of Attention to the Practice Decrement

Several investigators have postulated mechanisms to account for the practice decrement. A number of these involve what might be called "attention". Such concepts have been used to explain why the illusion occurs, as well as why it decreases with practice. The confusion theories of the early workers (Auerbach, Brunot, Láska, Müller-Lyer, and Schumann) are based on this concept--that the horizontal segment of the figure is difficult to isolate from the oblique lines because they distract the observer's attention away from the space being judged. Drawing the subject's attention to the horizontal line by instructions (Benussi, 1904; Gardner & Long, 1961) or by making it more prominent than the rest of the figure (Benussi, 1904) has the effect of reducing the illusion. Analytical inspection of certain parts of the pattern may be important in reducing the illusion, according to a study by Kobayashi (1956).

He demonstrated that overestimation and underestimation of the two halves of the figure are attributable to distortion of the horizontal line at the points nearest to its junctions with the obliques. The practice decrement of the Müller-Lyer illusion has been said to involve the overcoming of errors caused by confusion (Judd, 1902; Ladd & Woodworth, 1911; Lewis, 1908; Seashore, et al., 1908), comparison of the two parts of the figure being judged (Day, 1962), and deployment of attention (Noelting, 1960).

Gardner (1961) has studied attention deployment as a determinant of visual illusions by employing the factor analytic technique. From the results of a series of visual tests, he extracted two factors which are related to attention. These were "field articulation", the ability to give differential responses to relevant and irrelevant cues in a stimulus, and "scanning", the extensiveness of sampling stimuli. He attributed the Müller-Lyer illusion mainly to field articulation, which involves the need to pay attention to the relevant lines in the figure. He also suggested a relationship between field articulation and task difficulty. "Effective observation of Field Articulation also depends upon the difficulty of achieving selective attention to part of the field. For example, the difficult form of the Müller-Lyer illusion used in the present experiment (short, impressive angled lines close to the horizontal line) elicits Field Articulation. Responses to easier forms of the illusion may, however, be determined primarily by factors other than Field Articulation." (Gardner, 1961, pp. 125-126)

In a further experiment on this topic, Gardner and Long (1962)

found that extensiveness of scanning and selectiveness of attention were uncorrelated. Field articulation, they claim, is a general characteristic of the individual's cognitive behavior. They say these individual consistencies in selectiveness of attention can be observed only when the irrelevant stimuli, ideas, or memories are quite compelling.

The importance of attention in determining what is perceived has been shown in a number of experiments. One will be cited as an example. Santos, Farrow and Haines (1963) found that perception of a word in a display with normal figure-ground relationships reversed was facilitated by pretraining on reversible figures and figure-ground tasks. There was essentially a transfer of attention to specific aspects of the stimulus, or a transfer of a particular way of organizing the stimulus. They suggest that learned attentional habits may facilitate or inhibit later performance. These effects may be mediated by a number of factors: expectation of certain events, task orientation, scanning of details and subsequent articulation of images, flexibility and scope of attentional processes, and complex cognitive and emotional factors operating to modify the perception.

Vernon (1962) points out that perception improves as attention is directed more narrowly and specifically. She cites evidence that training in a particular type of attending transfers from a visual discrimination task to one which is quite different.

Attention can be conditioned by reinforcing perception of specific parts of a stimulus array. Fisch and McNamara (1963) induced greater attention to one side of the visual field through reinforce-

ment with tokens. Scanning was found to be partly a function of preconditioned attentional behavior. They related this kind of attention mechanism to perceptual learning, saying "From a perceptual learning point of view, this attention factor can be assumed to function in the service of a scanning mechanism which extends the range of potential information input and which provides for an optimum utilization of cues." (pp. 905-906). They conclude that attention, as an act, can be manipulated within the learning paradigm.

The work of Noelting (1960) on decrement of the illusion in children and adults suggests the importance of attention in this phenomenon. Interviews with individual subjects after the experimental sessions revealed a tendency for those who had shown no practice decrement to report that the task was not difficult or tiring, and that little effort was required in judging the figure. Subjects who had shown a decrement tended to report fatigue from the visual concentration. He proposed that there are two levels of perceptual organization--automatic "couplings" effected by the figure itself, and active "couplings" introduced by the observer. The latter lead to a more objective perception of the figure. Eye-movements are important in this active perception, according to Noelting. The adult's increased eye-movements and capacity to analyze apparently reduce the effect of the illusion. The increase in perceptual activity, which Noelting claims appears around the age of seven, involves better co-ordination of explorations. Piaget and Lambercier (1950) had previously suggested that fixation of the angles of the figure cause the illusion, and that analysis of this part of the stimulus by perceptual-motor explorations causes the decrement.

These differences in the magnitude of the illusion with age may be instructive in understanding the mechanism responsible for the practice decrement. Piaget and Lambercier say that children have greater difficulty than adults in attending to the relevant features of a visual stimulus. Increasing capacity to restrict attention and greater skill in analyzing visual information are considered to account for the smaller illusion in adults. Noelting uses this explanation for his finding that five and six year old children show an increase in the illusion with practice, while older children and adults show a decrement. Younger subjects are more easily distracted by the oblique lines of the figure, and are unable to overcome this distraction.

Rudel (1965) also studied the practice decrement in children, but found no decrement in subjects under 13 years of age. However, the use of a perceptual aid, the bisection of a line, led to a decrement with practice. This suggests the transfer of training on a non-illusion task to the judgment of the illusion figure.

The development of attention, which has been postulated by some experimenters as the mechanism responsible for the practice decrement, does not appear to be a passive phenomenon, elicited automatically by particular stimulus configurations or experimental conditions. Lewis (1908) and Noelting (1960) both say that effort on the part of the observer is required in order to overcome the illusion. Piaget and von Albertini (1950) say that an increase in "activité perceptive" (perceptual activity) is an important factor in reducing the illusion's magnitude in older children and adults.

The discussion of attention up to this point makes it appear

that this concept is related only to the learning interpretation of the practice decrement (i.e., learning to overcome errors by paying attention to the proper stimulus dimensions). It must be pointed out that attention can be interpreted in terms of satiation, according to Köhler and Adams (1958). They say that satiation is accelerated and figural after-effects enhanced under conditions of close attention.

It can be seen that a great deal of effort has been put into gathering evidence relevant to the problem of why the Müller-Lyer illusion decreases in magnitude with practice. Köhler and Fishback (1950a; 1950b) have been the chief proponents of the satiation hypothesis. Many of their arguments in this favor are based on isolated findings of earlier investigators. The data which Köhler and Fishback provide is based for the most part on small numbers of subjects and few observations. Those who favor a learning interpretation have shown on a number of occasions that predictions made from the satiation theory fail. A high proportion of their experiments appear to have taken a negative approach, attempting to disclaim the satiation hypothesis, with little effort to obtain positive support for a learning interpretation.

The conflicting evidence on issues such as the role of fixation, distribution of practice, and others illustrates the present state of uncertainty about this phenomenon. Some of these conflicting findings, for example, the failure of Day (1962) and Eysenck and Slater (1958) to find a practice decrement, may be attributed to the particular psychophysical procedure they employed. The

importance of this variable was considered earlier in this review (Parker & Newbigging, unpublished manuscript).

When the relevant data are assessed, the decrement of the Müller-Lyer illusion with practice appears to be best understood as a learning process, rather than as a physiological change in the cortex in the sense that Köhler and his associates had proposed. Changes in the appearance of the illusion figure with practice must certainly have physiological correlates, but they are not yet understood. Suggestions of a specific mechanism underlying the practice decrement have been based for the most part on ambiguous findings.

In view of the limited attempts to show how the practice decrement of the Müller-Lyer illusion fits into a theoretical framework, this review will be concluded with a statement of how this phenomenon might be understood in terms of perceptual learning theory.

The Practice Decrement as a Perceptual Learning Phenomenon

The decrement of the Müller-Lyer illusion with repeated presentations can be thought of as an example of perceptual learning. It meets the requirements of the definition of perceptual learning suggested by Wohlwill (1958). He proposed that perceptual learning might be regarded as "... the development of a transfer of a previously learned set of responses to a new set of stimuli, the possibility of this transfer inhering in the physical characteristics of the stimuli." (p. 284). In the case of the Müller-Lyer task, the previously learned responses would be the judgment of the relative lengths of the two horizontal extents. It is assumed that the subject has had previous

experience making comparative judgments of this kind.

Wohlwill's definition corresponds with the theoretical formulation of J. J. Gibson and E. J. Gibson (1955a; 1955b). They propose that perceptual learning involves a progressive elaboration of the qualities of the stimulus, or a "differentiation" of the stimulus input, which gradually leads to more veridical perception. "Perceptual learning is taken to be the activity of achieving and improving contact with the environment--of discovering new properties of the world by discriminating new variables in the stimulus flux." (J. J. Gibson, 1959, p. 486) An assumption basic to this theory is that the total stimulation contains all that is needed to account for visual perception, so the hypothesis of sensory organization is unnecessary (J. J. Gibson, 1950).

In their initial statement of what perceptual learning involves, the Gibsons (1955a; 1955b) did not specify a mechanism whereby discrimination of the properties of a stimulus comes about. However, the need for a theory of selective attention was recognized and a theoretical formulation of this concept was later developed by J. J. Gibson (1959; 1963). He suggested that the invariant properties of the physical world are not constructed by the observer, but are discoverable by the attentive adjustments of the sense organs and by the "education of attention." There is little empirical evidence, however, that attention is the mechanism involved in the perceptual learning process. Simple repetition of the same stimulus complex might allow the receptive system to pick up new variables through adjustments of the sense organs. On the other hand, objects might

become differentiated only through experience with other objects. J. J. Gibson (1959) favors the latter explanation, differentiation through contrast with different things, rather than repeated impressions of the same thing. He says that no conclusion on this matter is possible, because not enough is known about the influence of simple repetition of a stimulus.

This perceptual learning formulation has been applied to the practice decrement of the Müller-Lyer illusion by Parker and Newbigging (1963). They suggest that, with repeated presentation of the figure, the horizontal extents become more clearly discriminated, and the disturbing influence of the obliques gradually disappears. As this occurs, the subject's judgments would come to correspond more closely with the physical properties of the stimulus.

This review of the literature leads to the following conclusions concerning the present state of knowledge about the Müller-Lyer illusion. Certain stimulus variables are important in determining the magnitude of the illusion, but just how these operate and interact is unclear because of the lack of adequate data. This points to the need for a carefully controlled investigation of the major stimulus determinants of the illusion. There can be little doubt that practice in judging the illusion leads to a decrement in its magnitude. The conditions under which this decrement occurs are a point of dispute. Differences in procedural details and lack of proper controls have led to conflicting results. Within the range of parameters studied, information is limited mainly to subject variables and procedural variables. Data on the stimulus variables which determine the practice

decrement appear to be limited to brightness and size of the visual field. Nothing is known about how the stimulus components of the figure influence the practice decrement.

Experiments on the practice decrement of the Müller-Lyer illusion have been concerned for the most part with whether or not the decrement occurs under specific conditions. This is an all-or-none approach. More detailed information on the influence of the stimulus variables on the rate of the practice decrement may provide a better understanding of this phenomenon.

The purpose of the experiments to be described was to examine, under properly controlled conditions, the influence of the length and angle of the oblique lines in the Müller-Lyer figure on the magnitude of the illusion and to determine how the practice decrement is affected by these two and one other stimulus variable, saliency of the horizontal line. It was also expected that these data would provide some insight into the mechanism underlying the practice decrement of the illusion. The first experiment studied the relationship of length and angle of the obliques on the magnitude of the illusion. Subsequent experiments dealt with the stimulus determinents of the practice decrement.

CHAPTER THREE

EXPERIMENT 1

As discussed in the historical review, a number of the physical characteristics of the Müller-Lyer figure have been investigated in efforts to discover how the stimulus characteristics of the pattern affect the magnitude of this illusion (Benussi, 1904; Heymans, 1896; Lewis, 1909; Piéron, 1911). Since most of this work was done more than fifty years ago and does not meet current standards of psychological research, and since one of the purposes of this thesis is to find out whether the same stimulus variables which influence the magnitude of the illusion also affect its decrement with practice, it was considered necessary to carry out a more thorough, better controlled investigation of the factors contributing to the illusion.

In this experiment, as well as the others, two essential controls were exercised. First, the right-left orientation of the figure was counterbalanced over subjects to control for possible bias associated with viewing the stimulus in specific parts of the visual field (Brown, 1953); second, a psychophysical procedure was used which eliminated the systematic influence of adjusting the stimulus in one direction or the other (Parker & Newbigging, unpublished manuscript). A large scale investigation of these parameters would, it was hoped, establish the influence of these variables

on the magnitude of the illusion. Investigated in this first experiment are two stimulus variables, length of the oblique lines and angle between them, which have been shown to have an influence on the magnitude of the illusion.

METHOD

The basic apparatus and general procedure, which were employed in all of the experiments, will be described in detail only for Experiment 1. Differences in procedural details and stimulus materials in subsequent experiments will be described in the appropriate sections.

Apparatus and Procedure

The basic apparatus consisted of a rectangular panel 48 inches wide and 26 inches high. It was constructed of wood and painted flat white. A piece of white stag blank 44 inches x 26 inches, which served as a homogeneous background, was attached to the front of the panel. The stimulus figure (the Müller-Lyer pattern) was attached to the centre of the panel and held firmly in place. The movable centre arrowhead of the figure was attached to a string that came through two small holes in the panel. The holes and string in front of the panel were hidden from view by the horizontal portion of the stimulus figure. The string was moved by a pulley driven by a reversible, variable speed, electric motor fixed to the back of the panel. The motor could be operated by the experimenter (E) or by a remote control key on the table in

front of the subject (S). A pointer was fixed to the string behind the panel so that it moved along a scale on the back of the panel. The position of the centre arrowhead could be measured to the nearest millimetre. When the S's key was depressed, the centre arrowhead moved at a speed of 1.4 cm. per second.

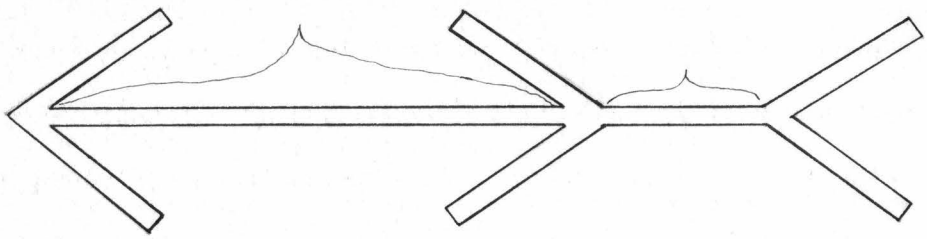
The stimulus figure, the Müller-Lyer illusion pattern with a movable centre arrowhead located behind the horizontal line, was attached to the centre of the panel. To the back of each stimulus figure were glued two 1½-inch steel pins which were inserted into small holes in the panel to hold the figure firmly in place. The figure was cut out of ten-ply stag blank painted flat black. The horizontal part of the figure was 20 cm. in length (measured from the junctions of the horizontal line and the oblique lines). The lines of the figure were 4 mm. wide.

The apparatus was set on a table 48 inches x 30 inches. The S sat in a chair at the end of a similar table which was placed perpendicular to the first. A chin rest attached to the end of the table served to hold the head in a stationary position 60 inches from the stimulus figure, which was at eye level. After the S was seated, he read the following instructions:

> The purpose of this experiment is to find out how people judge lines. Look at the figure on the panel in front of you. Your task is to divide the horizontal line in the figure by adjusting the centre arrowhead so that the two sides of the figure appear to you to be equal in length. The centre arrowhead can be moved by pressing

the key in front of you. It can be moved in only one direction at a time, so that you will be unable to move it back if you go too far.

The points of reference to use in dividing the horizontal line are indicated in the figure below. Remember that you are to adjust the centre arrowhead so that the two parts of the horizontal line appear equal.



An opportunity was given for the S to ask questions about the instructions, and he was then queried by the E to ensure that he understood them. If there was any doubt about them, the E explained the instructions again verbally, demonstrating on the figure itself the points of reference for making the judgment. Each S performed 30 trials. At the beginning of each trial the adjustable centre arrowhead was placed by E obviously too far to the right or left of the centre position. These settings were made according to a predetermined random order to control for any systematic bias associated with adjusting the centre arrowhead in one direction or the other. Three different settings in each of the right and left positions were used, each one an equal number of times. Ss were observed by the E throughout the experiment by means of a mirror located behind the S. This

was done to ensure that the S's chin was kept on the chin rest at all times and that he did not use aids, such as his hands, to gauge the length of the stimulus. The experimental room was illuminated by overhead daylight flourescent lights. The brightness of the panel was 22 footcandles at the S's eyes.

Subjects

The Ss were students selected at random from an Introductory Psychology course at McMaster University. A total of 160 Ss were tested--16 groups of 10 (6 male and 4 female) each. The average age of the sample was 20.1 years, ranging from 17.8 to 26.7 years.

Design

A Lindquist Type III design (Lindquist, 1953) with two between-subjects variables (angle and length of oblique line) and one within-subjects variable (practice) was used. Each group of Ss viewed only one of the 16 figures. The 10 Ss in each group were assigned to groups on a random basis. One-half of the Ss in each group viewed the stimulus figure with the standard part on the left; the other half had the standard on the right. The oblique lines which formed the arrowheads of the figure were varied along two dimensions--angle and length.[1] Four angles, 30, 60, 90, and 120 degrees, were combined with each of four lengths, 1, 2, 3, and 4 centimeters, to make 16 different figures.

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1. Angle refers to that angle formed by the two oblique lines of each arrowhead. Length was measured from the end of the oblique line to the point where it joined the horizontal part of the figure.

RESULTS

The S's 30 trials were divided into five blocks of six for the purpose of examining the effect of practice. An analysis of variance was performed on the data using total millimetres of illusion[1] in each block as the unit of analysis. A summary of this analysis is shown in Table I. All three main effects (angle, length, and trials) were highly significant ($p < .001$). None of the interactions was significant. Magnitude of the illusion increased as length of the oblique lines increased, and it decreased as angle between the obliques increased. There was also a decrement with practice. Figure 2, 3, and 4 show these relationships graphically.

DISCUSSION

The results of the first experiment indicate a strong positive relationship between magnitude of the Müller-Lyer illusion and length of the oblique lines and a strong inverse relationship between magnitude and angle between the obliques. This confirms the earlier findings of Heymans (1896) and Lewis (1909). Decrement in the magnitude of the illusion also occurred with practice as Judd (1902), Mountjoy (1958a), and others have found. The amount of decrement was not great in this experiment, since a relatively small number of trials were administered. Mountjoy's (1961b) work on this topic is directly

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1. The term "illusion" will be used throughout this thesis to refer to the error in the direction of setting the centre arrowhead so that the part of the figure with inward-turned obliques (left half of Figure 1) is longer that the other part. That is, the normally underestimated half of the figure is set longer so that it appears equal to the overestimated half. Percent illusion was calculated by dividing the illusion, in millimetres, by 100, the length of each half of the horizontal line when the two were physically equal.

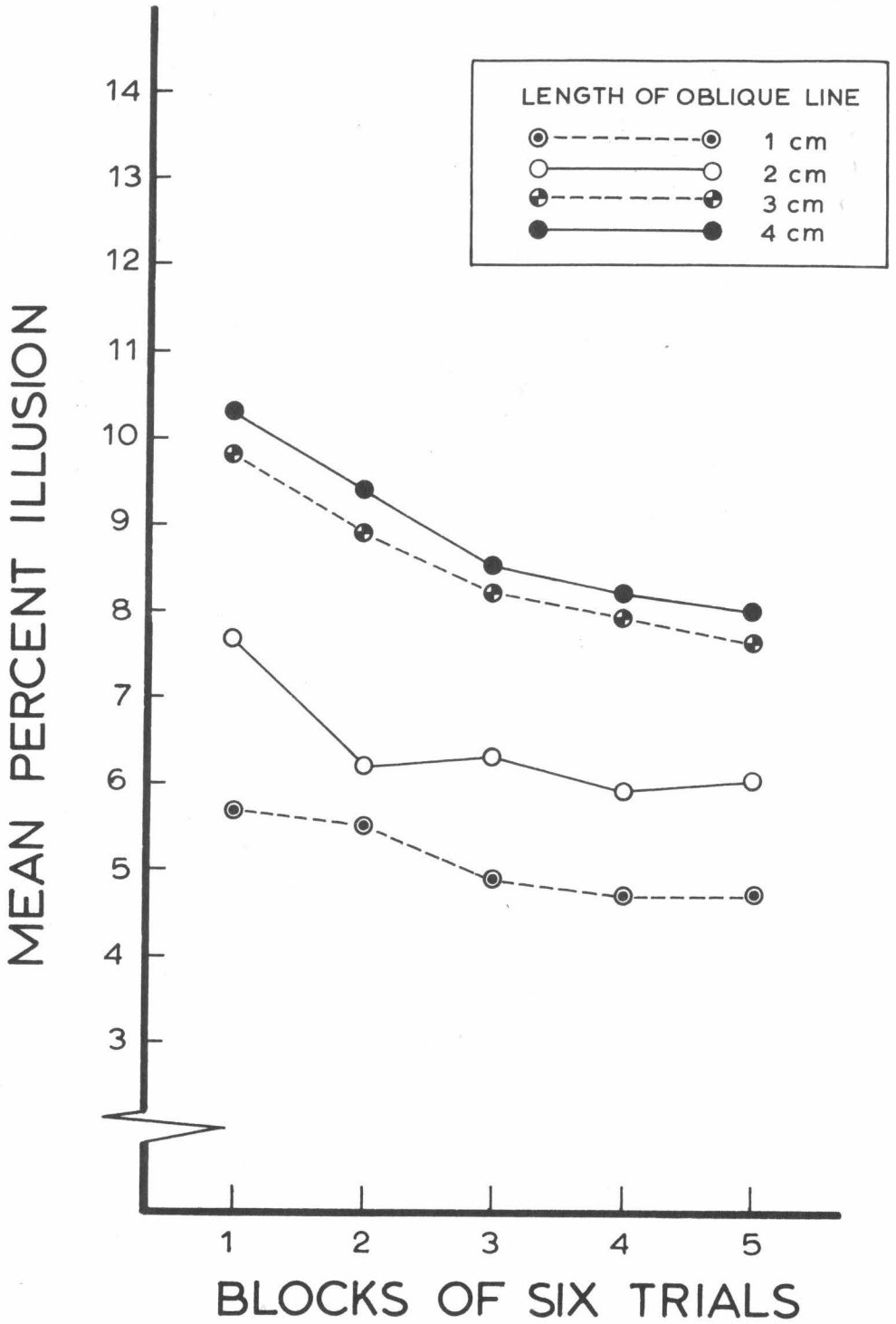

FIGURE 2. Mean percent illusion as a function of blocks of trials plotted separately for each of four lengths of the oblique lines (Experiment 1).

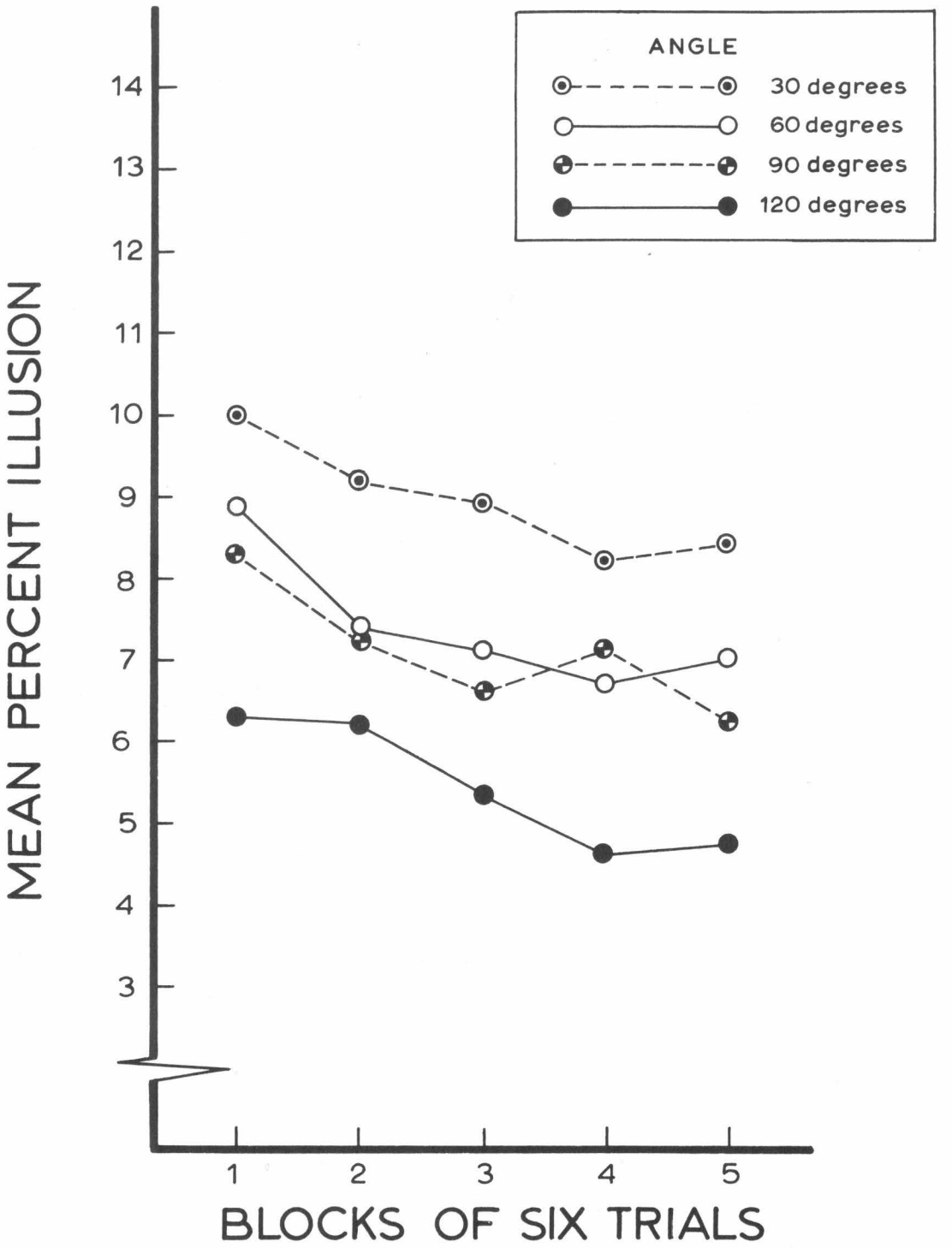

FIGURE 3. Mean percent illusion as a function of blocks of trials plotted separately for each of four angles between the oblique lines (Experiment 1).

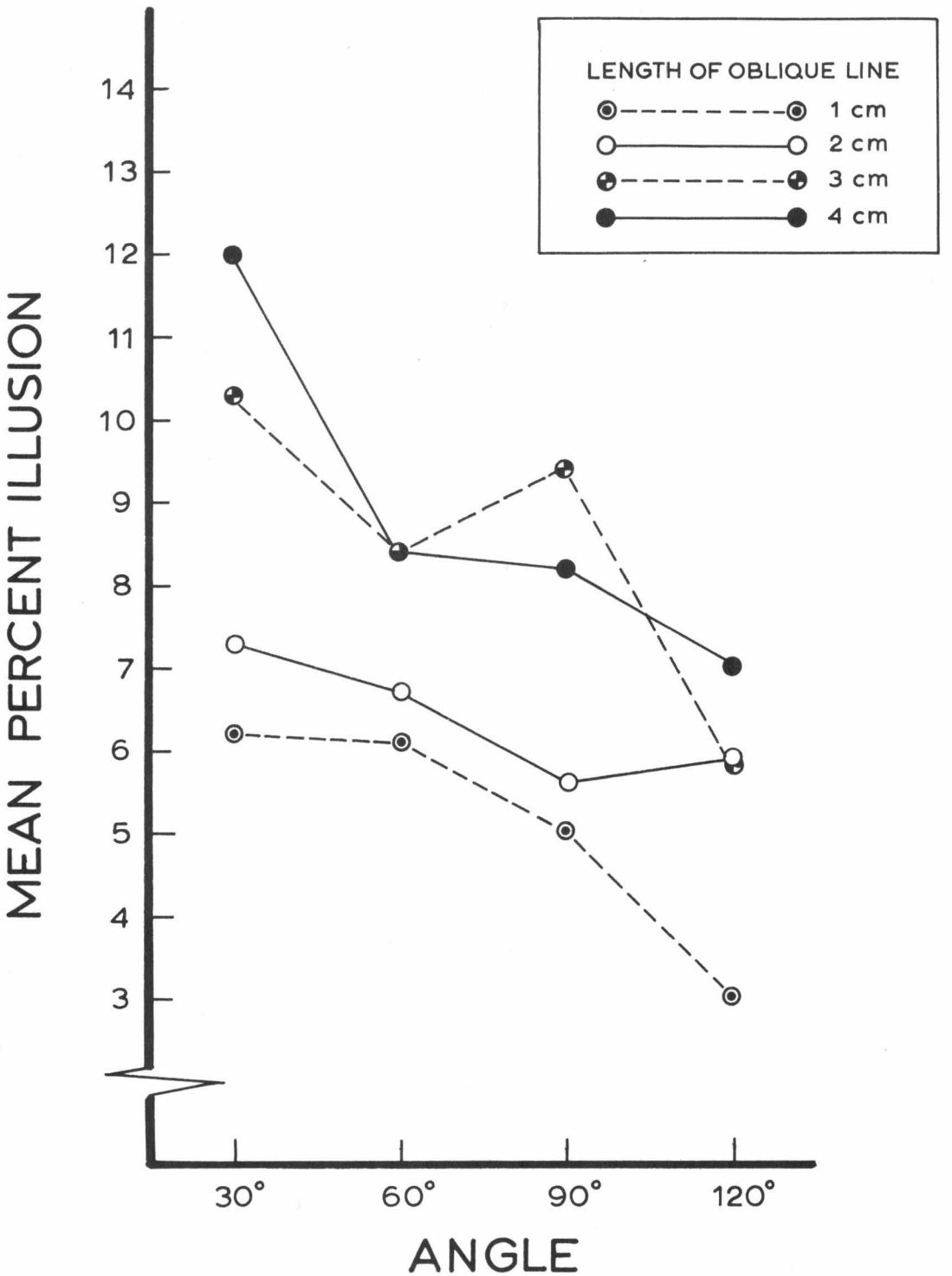

FIGURE 4. Mean percent illusion as a function of angle between the oblique lines plotted separately for each of four lengths of the oblique lines (Experiment 1).

TABLE I

SUMMARY OF ANALYSIS OF VARIANCE

Source	df	MS	F	P
Angle	3	15,054.53	7.56	<.001
Length	3	23,008.00	11.55	<.001
Angle x Length	9	1,678.07	0.84	NS
Error (b)	144	1,992.01		
Trials	4	3,158.30	21.23	<.001
Trials x Angle	12	134.17	0.90	NS
Trials x Length	12	125.35	0.84	NS
Trials x Angle x Length	36	171.44	1.15	NS
Error (w)	576	148.79		

comparable to the present experiment, since he gave Ss 31 trials and divided these into blocks of 6 trials each for purposes of analysis. His figure with a 90-degree angle between the obliques produced a decrement very similar in form to that of the same figure in Experiment 1. His data indicate a slightly greater illusion throughout the practice series. This may be due to his use of an illusion pattern without a horizontal line.

The data from the present experiment show the same relationships as do Heymans' data with regard to different angles and lengths of the oblique lines. The fact that he found a greater illusion can probably be attributed to differences in methodology. The increase in magnitude of the illusion with the increase in length of the obliques also agrees closely with findings reported by Judd (1905).

The present data indicate, as Lewis (1909) had previously suggested, that Heymans' cosine law holds only approximately. The value of the average illusion divided by cosine of the angle varies from 16.6 (for the 30-degree figure) to 20.2 (for the 120-degree figure). It can be seen from Figure 2 that as the length of the obliques increases, especially from 3 to 4 cm., the magnitude of the illusion increases less rapidly. This is in agreement with Heymans' maximum law.

The absence of an interaction between the length and the angle of the obliques suggests that they operate independently of each other to determine the magnitude of the illusion. With the exception of this finding and the lack of support for the cosine

law, this experiment reveals nothing new, but serves nevertheless as an important confirmation of the work of earlier experimenters. With the better control of relevant variables and a larger sample, it provides a sounder basis on which to make statements about stimulus determinants of the magnitude of the Müller-Lyer illusion.

CHAPTER FOUR

EXPERIMENT 2

Since the angle and the length of the oblique lines (Heymans, 1896) and the saliency of the horizontal line (Benussi, 1904) all play a large part in determining the magnitude of the Müller-Lyer illusion, they may well influence the decrement of the illusion which occurs with repeated trials. There is no experimental evidence on this point, for little attention has been paid to the part played by the stimulus characteristics of the figure itself. The next three experiments were therefore concerned with this problem.

In Experiment 2 the relationship between the rate of decrement of the illusion with practice and the length of the oblique lines was examined. Some data are available from the first experiment, but, as it was not primarily concerned with practice effects, the number of trials administered was not sufficient to provide a clear answer to the problem.

METHOD

Subjects

The Ss were 40 male and 40 female students selected at random from Summer School Psychology courses. Their ages ranged from 19 to 46 years, with a mean of 25.6 years.

Stimulus Material

The stimulus figures were constructed as in Experiment 1, with the exception of the following changes. The horizontal line connecting the arrowheads (which were painted flat black) was white instead of black. This configuration was used in order to maximize the illusion. The movable centre arrowhead was located in front of the horizontal line, rather than behind it as in Experiment 1. This was necessary, since it was essential that the S be able to see the apex of this arrowhead in order to follow the instructions which had been slightly altered.

Design

The design employed was, as in Experiment 1, Lindquist Type III. The between-subjects variables were length of the oblique lines and sex; the within-subjects variable was amount of practice (blocks of trials). The Ss in each of the four groups of 20 (10 male and 10 female) viewed one of the four stimulus figures. These differed only in the length of the oblique lines, which were 1, 2, 3, or 4 cm. long. In all figures the oblique lines formed an angle of 60 degrees. All Ss were randomly assigned to groups. The left-right orientation of the figure was counterbalanced within groups, as in Experiment 1.

Procedure

The procedure followed was identical to that of the preceding experiment, except that each S performed 100 trials, and that there

were changes in the instructions as to the points of reference for making the judgment. The reference points for the present experiment were the vertexes (or inside junctions of the obliques) of the arrowheads on the standard side of the figure and the points of the arrowheads on the other side. The points of reference used in Experiment 1 were inappropriate here, since it would have been difficult for the S to distinguish the junction of the oblique lines with the white horizontal line, which was of the same material and brightness as the background.

RESULTS

Each S's series of trials was divided into 10 blocks of 10 trials in order to examine the practice effect. The analysis of variance (Table II) shows that two of the main effects, length ($p < .025$) and trials ($p < .001$), are significant. There was no difference between males and females.[1] None of the interactions was statistically significant. Figure 5 depicts the decrement in the illusion over the 10 blocks of trials for each group separately. Magnitude of the illusion decreased with practice as expected, and it was directly related to the length of the oblique lines. There were no differences in the rate of decrement of the illusion due to the length of the oblique lines. This is shown by the lack of the significant trials x length interaction. The rate of decrement was practically the same for all groups.

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1. The sex variable was also examined in the next two experiments. Since no differences were found in any of these experiments, this variable will not be mentioned again.

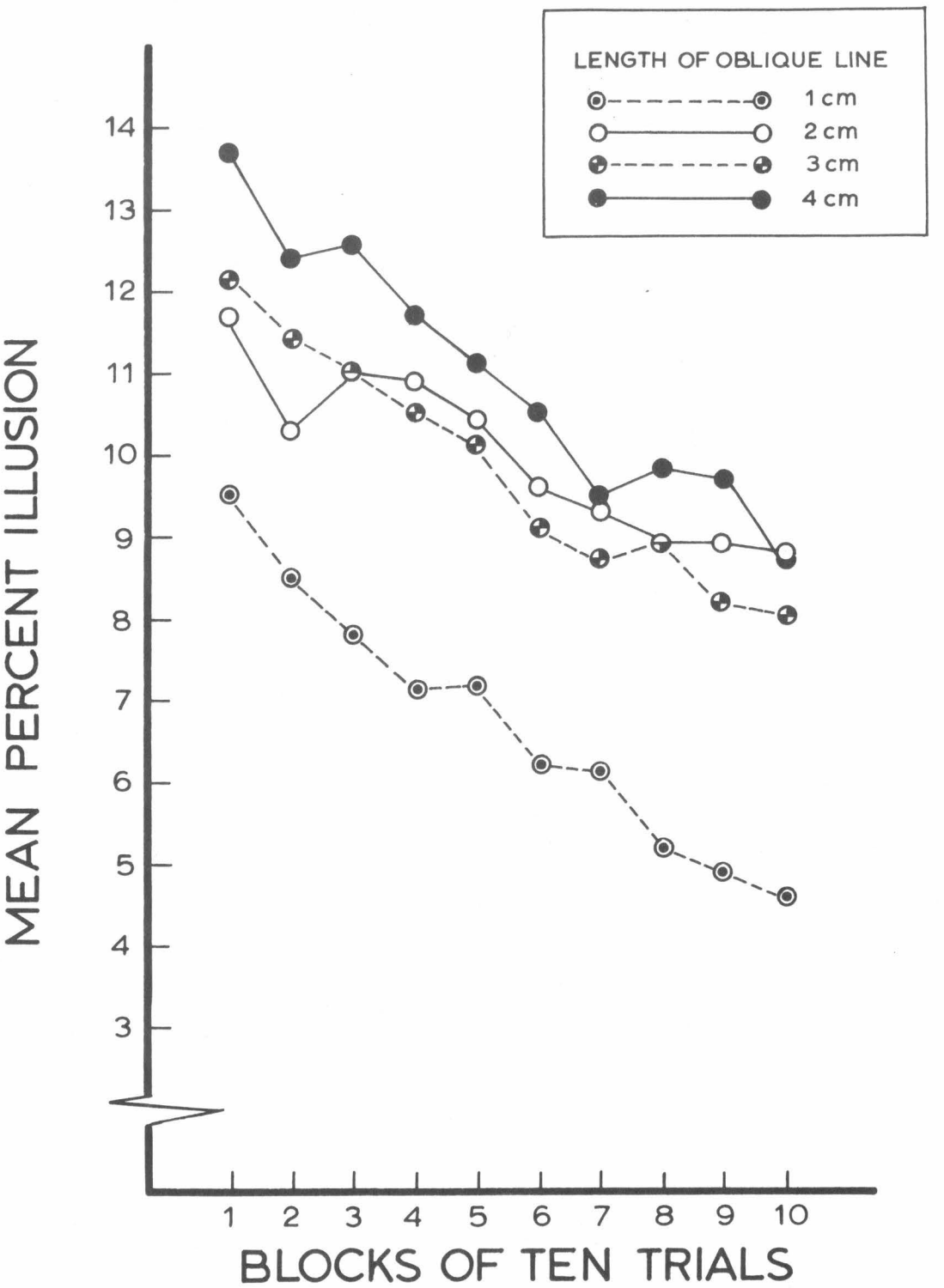

FIGURE 5. Mean percent illusion as a function of blocks of trials plotted separately for each of four lengths of the oblique lines (Experiment 2).

TABLE II

SUMMARY OF ANALYSIS OF VARIANCE

Source	df	MS	F	P
Sex	1	25,032.00	1.53	NS
Length	3	66,374.85	4.07	$<.025$
Sex x Length	3	16,575.75	1.02	NS
Error (b)	72	16,316.26		
Trials	9	15,631.78	28.07	$<.001$
Trials x Sex	9	206.08	0.37	NS
Trials x Length	27	328.05	0.59	NS
Trials x Sex x Length	27	433.35	0.78	NS
Error (w)	648	556.82		

DISCUSSION

Experiment 2 clearly shows that changing the length of the oblique lines does not influence the amount of decrement over 100 trials, although it does affect the magnitude of the illusion.

The magnitude of the illusion over the first 30 trials is somewhat greater in this experiment than in the 30 trials of Experiment 1. This can probably be attributed to the difference between the stimulus figures used in the two experiments. In the present experiment the horizontal line connecting the arrowheads was left unpainted, and so was the same color as the background, though it could be discriminated from it. This configuration is known to produce a greater illusion that the other (Benussi, 1904).

It can be seen from Figure 5 that most of the variance due to differences in the length of the oblique lines can be attributed to the 1-cm. line which causes a much smaller illusion than the others.

CHAPTER FIVE

EXPERIMENT 3

This experiment studied the relationship of the second major stimulus variable, the angle between the oblique lines, to the practice decrement of the Müller-Lyer illusion.

METHOD

Subjects

The Ss were 40 male and 40 female students selected at random from all those enrolled in an Introductory Psychology course. Their ages ranged from 17.9 years to 25.1 years, with a mean of 19.6 years.

Stimulus Material

The stimulus figures were identical to those used in Experiment 2, except that the angle between the obliques was varied, while their length remained constant at 3 cm. The angles used were 30, 60, 90, and 120 degrees.

Design

A Lindquist Type 1 design was used. Angle between the oblique lines was the between-subjects variable and amount of practice was the

within-subjects variable. Twenty Ss (10 of each sex) judged each of the four stimulus figures.

Procedure

The procedure followed was the same in all details as that for Experiment 2.

RESULTS

The trials were divided into 10 blocks of 10 to examine the practice effect. According to the analysis of variance summarized in Table III, the only significant main effect was trials ($p < .001$). The lack of a statistically significant effect of angle appears to be due to the differential rates of decrement. These results are shown graphically in Figure 6, where the magnitude of the illusion for each block of trials is plotted separately for each group. The faster rates of decrement with smaller angles, which are apparent from the graph, are indicated by the analysis of variance interaction between trials and angle ($p < .001$). Although the initial magnitude of the illusion on block 1 was in the expected order for the four groups (larger illusion with small angles), the differences were not statistically significant over the series of 100 trials. The groups with larger initial illusions had a greater decrement, thus attenuating the initial differences. An analysis of variance performed on the data from the first five blocks of trials indicated significant differences due to angle ($p < .01$) and trials ($p < .001$). (See Table IV) It should be noted that the trials x angle interaction, which was significant

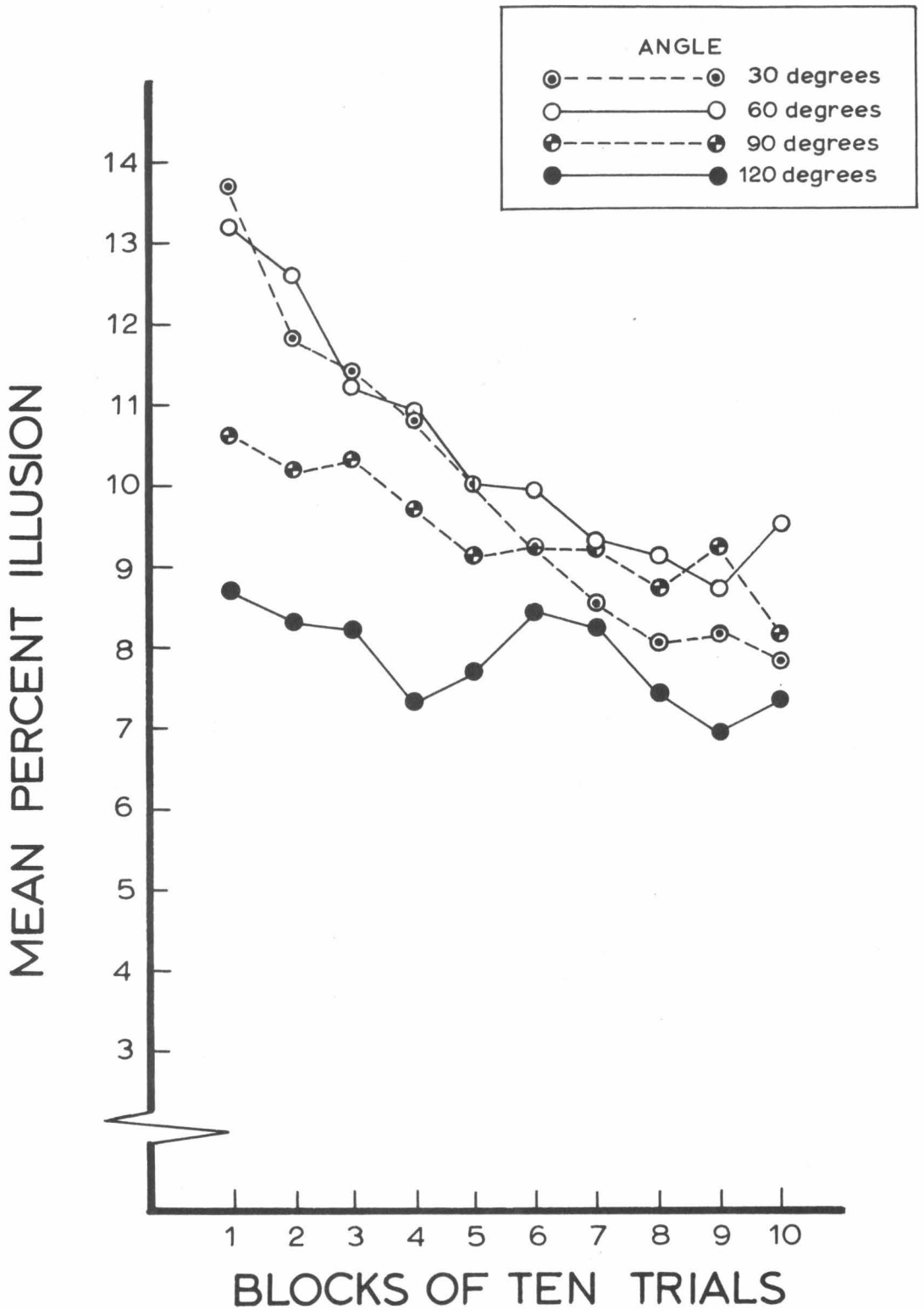

FIGURE 6. Mean percent illusion as a function of blocks of trials plotted separately for each of four angles between the oblique lines (Experiment 3).

TABLE III

SUMMARY OF ANALYSIS OF VARIANCE

FOR ALL TRIALS

Source	df	MS	F	P
Angle	3	25,201.60	1.89	$<.20$
Error (b)	76	13,356.82		
Trials	9	10,511.94	26.78	$<.001$
Trials x Angle	27	1,268.90	3.23	$<.001$
Error (w)	684	392.56		

TABLE IV

SUMMARY OF ANALYSIS OF VARIANCE

FOR FIRST FIFTY TRIALS

Source	df	MS	F	P
Angle	3	28,067.60	4.49	$<.01$
Error (b)	76	6,244.66		
Trials	4	6,610.43	17.31	$<.001$
Trials x Angle	12	463.58	1.21	NS
Error (w)	304	381.83		

TABLE V

SUMMARY OF ANALYSIS OF VARIANCE

FOR LAST FIFTY TRIALS

Source	df	MS	F	P
Angle	3	4,977.10	0.58	NS
Error (b)	76	8,529.02		
Trials	4	1,593.00	10.82	$< .001$
Trials x Angle	12	430.58	2.93	$< .01$
Error (w)	304	147.21		

over the series of 100 trials, was not statistically significant when calculated for the first 50 trials alone. When the data from blocks 6 to 10 were examined, the results were much the same as those for all the data. Only trials and trials x angle interaction were significant (Table V).

DISCUSSION

The results of this experiment show that a greater decrement is produced by figures with small angles between the obliques than by large-angled figures. The trials x angle interaction ($p < .001$) indicates the extent of this differential effect. This interaction was so great that the initial differences in the magnitude of the illusion practically disappeared after 100 trials. The contrast between the data from the first five blocks of trials and all of the data points up the danger of generalizing beyond the specific experimental conditions (number of trials in this case). The impression gained from the first 50 trials, that angle had no effect on the practice decrement, is quite different from that based on 100 trials. It is impossible to predict from the present data what might happen if subjects were given a large number of trials, say 800 or 1,000. The decrement with practice and the differences due to angles between the obliques serve as confirmation of the first experiment.

Two of the main stimulus determinants of the illusion's magnitude appear to influence the practice decrement in different ways. The present experiment shows that angle between the obliques has a definite effect on the rate of decrement with practice, while Experiment

2 indicates no such effect from varying the length of the oblique lines.[1]

Before attempting to understand why the illusion decreases faster with some stimulus configurations (small angles) than with others, it is essential to know why it decreases with practice at all. In the literature on this topic there are two types of explanations of the practice decrement--satiation of brain cells and interpretations based on learning. Even though the present results are not inconsistent with the satiation theory, it was felt that the most meaningful explanation was one which treated the decrement as a learning process, since the bulk of the relevant evidence reviewed in Chapter Two has failed to confirm predictions based on the satiation hypothesis concerning the decrement of this illusion with practice.

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1. Since the subjects in Experiment 2 were Summer School students whose average age was 6 years greater than that for the subjects in Experiment 3, it was considered necessary to determine whether the difference between the two stimulus variables (or the failure to find different rates of decrement upon varying the length of the oblique lines) could be due to population differences. Inspection of the data revealed no relationship between age and magnitude of the illusion. A comparison (by analysis of variance) of the data from the same figure used in Experiments 2 and 3 (60-degree angle with 3-cm. obliques) showed that it resulted in practically the same magnitude of illusion and in an identical decrement over the 100 trials (the slope of the best-fitting straight line was -.47 in both experiments). An additional comparison was made between groups from Experiments 1 and 2 where comparable figures were judged (60-degree figures with 1-, 2-, 3-, and 4-cm. obliques). This analysis of variance based on the first five blocks of six trials showed no significant interaction between population and either of the other variables (trials and length). Had the Summer School population been different from the others as far as the practice decrement is concerned, there would have been an interaction between population and trials in the above comparisons. Differences in population do not appear to explain why the amounts of decrement were the same when length of the oblique lines was varied.

Many of the learning explanations of this decrement have suggested that the development of an "analytic attitude", or an increase in attention to the parts of the figure being judged, on the part of the observer reduces the influence of the oblique lines, weakening the illusory effect. This analytic attitude makes it easier to isolate or discriminate the horizontal line from the interfering context of the obliques. This is the general principle involved in the explanations proposed by Day (1962), Lewis (1908), Noelting (1960), Parker and Newbigging (1963), and Seashore, et al. (1908).

It seems quite plausible that the practice decrement is the result of the development of an analytic attitude or increased attention to specific parts of the stimulus figure, and that different degrees of such attitude might be induced by different configurations of the stimulus. Gardner (1961) suggested something to this effect when he said that field articulation (ability to pay attention to relevant aspects of a stimulus) depends in part upon the difficulty of achieving selective attention to part of the visual field. It may be that closer attention and greater effort are required to isolate and judge the horizontal line of a figure with a more interfering context (smaller angles). Elaboration of this interpretation and supporting evidence for it will be discussed in some detail in the final chapter.

Inspection of Figure 6 reveals what looks like a relationship between initial illusion and the amount of decrement over 100 trials. For the 30-degree figure the magnitude of the illusion starts highest and shows the greatest decrement. The opposite is true of the 120-degree figure. This raises the question of whether certain subjects

show a marked improvement simply because they start with a greater illusion and have more room to improve. If this were the case, there would be a correlation between initial illusion and amount of decrement. In order to test this possibility, product-moment correlations were computed for each group separately, using each subject's initial illusion on the first block of trials and the difference between this illusion on blocks 1 and 10. This correlation coefficient was significant for only one of the four groups.

Although this problem arises first in the present experiment, it comes up again in Experiment 4, so will be dealt with now. Similar correlations were computed for the four groups in Experiment 4. None of these correlations was significant. Examination of this question was extended to the data of the preceding experiment as well. There was a significant correlation in one group. Of the 12 correlation coefficients computed (from Experiments 2, 3, and 4) between initial illusion and amount of decrement, two were significant, four were .10 or less and one was negative. It should be noted that the appearance of two figures which produce approximately the same initial illusion, the 1-cm. figure in Experiment 2 and the 120-degree figure in Experiment 3, are influenced quite differently by practice. The former shows a marked decrement over 100 trials, while the latter changes very little. It appears safe to conclude that there is no systematic relationship between amount of decrement in the illusion with practice and the initial magnitude of the illusion. Small-angled figures lead to a greater decrement because of the nature of the stimulus, rather than because the initial illusion is greater with these figures.

CHAPTER SIX

EXPERIMENT 4

Up to this point the emphasis has been on two of the features of the Müller-Lyer figure which play an important part in determining the magnitude of the illusion. The angle between the oblique lines also influences the rate of decrement in the illusion with practice but the length of the oblique lines has no such effect. We now turn to a third stimulus variable--saliency of the horizontal line. Benussi (1904) has shown that the magnitude of the illusion can be influenced by manipulating the prominence of the horizontal line relative to that of the obliques. Since this variable is a determinant of the illusion's magnitude, it may also be a factor which influences the practice decrement. The following experiment was undertaken to establish the relationship between saliency of the horizontal line and rate of decrement in the illusion with practice.

METHOD

Subjects

Eighty Ss were selected at random from those registered in an Introductory Psychology course. The mean age of the sample was 20.1 years, ranging from 17.6 years to 26.8 years.

Stimulus Material

The stimulus figures were constructed as in Experiment 2. For all figures the length of the oblique lines was 3 cm. and they formed an angle of 60 degrees. Four different combinations of shading[1] of the horizontal line and oblique lines were used. The obliques were painted light gray on all figures. The four shades of the horizontal lines were, in order of the degree of prominence, black, dark gray, white, and light gray.

Design

A Lindquist Type I design was used. The between-subjects variable was shading of the horizontal line; the within-subjects variable was amount of practice. Different groups of 20 Ss (10 male and 10 female) judged each of the four figures.

Procedure

The procedure was the same as that for Experiment 2, except for the instructions, which were identical to those for Experiment 1. These instructions specified the points of reference for making the judgments as the junctions of the obliques and horizontal line, rather than the points and vertexes of the arrowheads. This was essential, since these points and vertexes could not be seen in the figure which was entirely light gray.

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1. The shading was varied by painting the specified parts of the figure with Monarch professional show card color. Black and white and a mixture of these were used. The gray colors were made by mixing black and white paint in the following proportions: light gray--5 parts white to 1 part black; dark gray--2 parts white to 3 parts black. These porportions represent the shadings judged (by a sample of 11 subjects) to be 1/3 and 2/3 of the way between white and black.

RESULTS

From Figure 7 it can be seen that the magnitude of the illusion decreases over 100 trials for each of the four configurations. The order of magnitude of the initial illusion, according to shading of the horizontal line, was: light gray (greatest), white, dark gray, and black(least). This order was maintained throughout the series of trials, except for the figure with a dark gray horizontal line, which decreased to values below those of the black figure after the fourth block of trials.

The analysis of variance (Table V1) indicates significant differences due to shading of the horizontal line ($p < .025$), trials ($p < .001$), and a trials x shading interaction ($p < .05$). It should be noted that most of the trials x shading interaction is due to the effect of the figure with a black horizontal line. An analysis of variance done excluding this figure showed no such interaction.

DISCUSSION

The results of this experiment indicate that another stimulus determinant of the illusion's magnitude, saliency of the horizontal line, influences the practice decrement. The figure with the least conspicuous horizontal line (light gray) led to the greatest decrement, while the most conspicuous horizontal (black) produced the least decrement. The differences in the magnitude of the illusion due to the shading of the horizontal confirm Benussi's (1904) finding that more conspicuous horizontal lines produce smaller illusions. In the

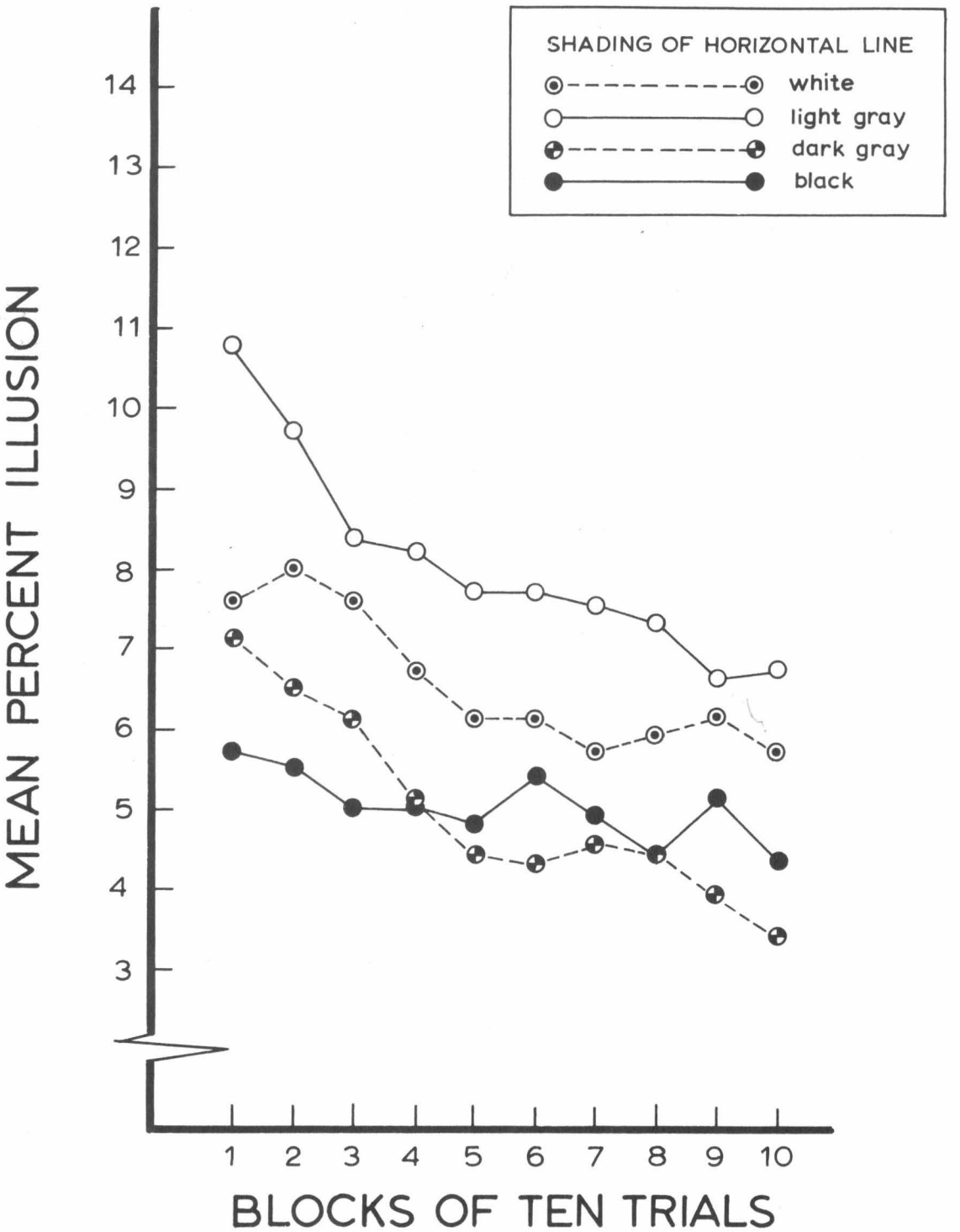

FIGURE 7. Mean percent illusion as a function of blocks of trials plotted separately for each of four degrees of shading of the horizontal line (Experiment 4).

TABLE VI

SUMMARY OF ANALYSIS OF VARIANCE

Source	df	MS	F	P
Shading	3	43.141.42	3.23	<.025
Error (b)	76	13,369.33		
Trials	9	6,665.37	19.26	<.001
Trials x Shading	27	548.01	1.58	<.05
Error (w)	684	346.11		

present experiment the white horizontal was more conspicuous (different from the obliques) than the light gray one, but less conspicuous than the dark gray, since it was the same brightness as the background.

The explanation proposed for the results of the preceding experiment also may be applied here. It is at least intuitively obvious that the parts of the figure to be judged are easier to isolate in the pattern with a black horizontal than in that with a light gray horizontal line. Less attention and effort are required to isolate the horizontal from the obliques in the former figure, and therefore a weaker (if any) analytic attitude is developed over the series of trials. The result is little change in the judgments of the figure. The increased attention and effort elicited by the light gray horizontal results in a considerable decrement of the illusion with practice.

The angle and length of the oblique lines in the figures of this experiment (60-degree angle and 3-cm. obliques) were those which produced a strong illusion and a marked practice decrement in the preceding experiments. However, when the horizontal line in this particular figure was made prominent, the effects of long obliques and a small angle diminished considerably.

CHAPTER SEVEN

EXPERIMENT 5

In the interpretation of the two preceding experiments, the different rates of decrement associated with variations in certain stimulus components of the illusion pattern were attributed to different degrees of analytic attitude elicited by these specific stimulus characteristics. However, there was little evidence in the data to support this particular interpretation. The purpose of the final experiment was to obtain evidence relevant to this interpretation.

The focus of this experiment was the trials x angle interaction found in Experiment 3. It will be recalled that the magnitude of the illusion decreased more rapidly in small-angled figures than in large-angled figures. It was proposed that judgment of the former stimuli led to an analytic attitude which gradually overcame the interfering influence of the obliques, reducing the magnitude of the illusion. If different degrees of analytic attitude are induced by practice with particular figures, then one ought to be able to detect and measure these. Such a perceptual attitude, once established, should last for a certain time, and might be expected to carry over or transfer to subsequent perceptual tasks of a similar nature (i.e. tasks in which attention or perceptual attitude influence performance). More specifically, the magnitude of the illusion produced by a Müller-Lyer figure after the subject had trained with a 60-degree figure should be less than the illusion produced if the subject had previously trained with a 120-degree figure. The small-angled figure would increase the subject's attention to the relevant aspects of the stimulus, and this

attention would transfer to the subsequent practice.

METHOD

Subjects

The Ss were 28 males and 28 females randomly selected from an Introductory Psychology course. Their mean age was 20.0 years with a range of from 18.2 years to 26.2 years.

Stimulus Material

The stimulus figures were the 60-degree figure and the 120-degree figure with 3-cm. oblique lines and a white horizontal line used in Experiment 3. These were chosen because the magnitude of the illusion in the former had shown a marked decrement with practice, while the 120-degree figure had shown practically no decrement.

Design

Ss were assigned at random to one of two groups, each consisting of 28 Ss. One group received 50 training trials with a 60-degree figure, while the other trained with the 120-degree figure. Following this training, each group was divided in half, Ss being assigned at random to subgroups. After a five-minute rest period one subgroup from each of the original groups practiced for an additional 50 trials on a 60-degree Müller-Lyer figure, while the other practiced for an additional 50 trials on a 120-degree figure.

Procedure

The procedure and instructions to the S were the same as in Experiment 2, with the exception of the rest period, during which S left the experimental room while the E changed the stimulus pattern on the panel or pretended to make a change in the apparatus in the case of Ss whose initial training and subsequent practice were with the same figure.

RESULTS

The series of trials were divided into blocks of 10, as in the previous experiments. The magnitude of the illusion and the practice decrement for the first 50 trials are shown to the left in Figure 8. Analysis of the data for these first 50 training trials revealed a marked decrement with practice ($p < .001$) and a trials x angle interaction ($p < .001$). (See Table VII) The difference between the magnitude of the illusion in the two figures was not statistically significant because of the interaction. The right half of Figure 8 shows the magnitude and the decrement for the transfer trials. Table VIII shows the analysis of variance summary resulting from a comparison of the transfer trials for all Ss who had trained with the 60-degree figure and all those who had trained with the 120-degree figure. Training with the 60-degree figure resulted in a smaller illusion in subsequent practice than did training with the larger-angled figure ($p < .05$). The magnitude of the illusion continued to decrease over the last 50 trials. A detailed examination

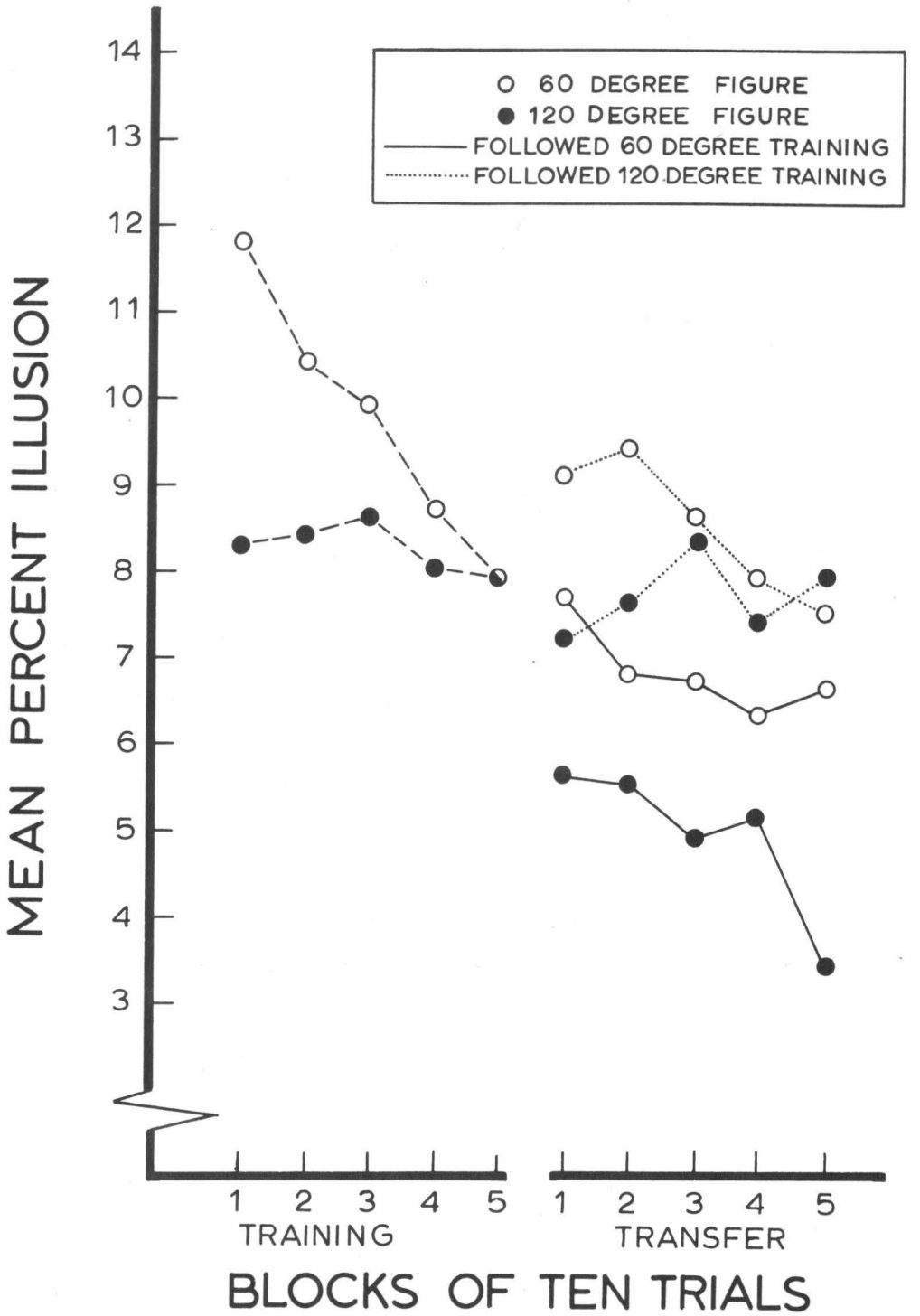

FIGURE 8. Mean percent illusion as a function of blocks of trials for both training series and transfer series. Training trials are plotted separately for each stimulus figure. Transfer trials are plotted separately for each figure judged and type of training (Experiment 5).

TABLE VII

SUMMARY OF ANALYSIS OF VARIANCE

FOR TRAINING TRIALS

Source	df	MS	F	P
Angle	1	16,218.00	3.08	<.10
Error (b)	54	5,274.20		
Trials	4	4,076.25	10.29	<.001
Trials x Angle	4	2,412.25	6.09	<.001
Error (w)	216	396.03		

TABLE VIII

SUMMARY OF ANALYSIS OF VARIANCE

FOR TRANSFER TRIALS

Source	df	MS	F	P
Training Figure (TF)	1	33,071.00	4.08	<.05
Error (b)	54	8,102.15		
Trials	4	1,007.50	2.59	< .05
Trials x TF	4	314.75	0.81	NS
Error (w)	216	388.35		

TABLE IX

SUMMARY OF ANALYSIS OF VARIANCE

FOR TRANSFER TRIALS WITH 120-DEGREE FIGURE

Source	df	MS	F	P
Training Figure (TF)	1	24,870.90	4.63	<.05
Error (b)	26	5,368.00		
Trials	4	244.00	0.85	NS
Trials x TF	4	728.75	2.55	<.05
Error (w)	104	286.01		

TABLE X

SUMMARY OF ANALYSIS OF VARIANCE

FOR TRANSFER TRIALS WITH 60-DEGREE FIGURE

Source	df	MS	F	P
Training Figure (TF)	1	9,895.00	0.91	NS
Error (b)	26	10,924.73		
Trials	4	1,065.75	2.21	<.10
Trials x TF	4	283.00	0.59	NS
Error (w)	104	482.13		

of the influence of training figure indicated that the effect was more marked in subsequent practice with the 120-degree figure than with the 60-degree figure. Magnitude of the illusion with the 120-degree pattern was smaller if practice had been preceded by a 60-degree figure than if it had been preceded by a 120-degree figure ($p < .05$). This analysis is summarized in Table IX. There was also an interaction between type of training and amount of decrement in subsequent practice with the 120-degree figure. When practice was with the 60-degree figure, the difference due to type of training was in the expected direction (smaller illusion after 60-degree training), although it was not statistically significant (Table X).

In order to rule out the possibility of biased sampling when the original groups were divided for further practice, analyses of variance were performed on the data from the first 50 trials to test the differences between the two pairs of subgroups. No differences were found.

DISCUSSION

This experiment was carried out to test the explanation of the practice decrement which was outlined in Experiment 3. It was necessary to give training that would bring about the extreme degrees of analytic attitude in order to assess the validity of this interpretation. The results of the experiment are, in general, consistent with the interpretation.

The result of the first fifty trials are in accord with the

findings of Experiment 3, that is, the figure with the smaller angle produced the greater illusion as well as the greater decrement with practice. The trials x angle interaction ($p < .001$) indicates the considerable difference in amount of decrement for the two figures.

There are a number of ways in which the data from the last 50 trials of the experiment can be analyzed. It was expected that training with the 60-degree figure would produce a greater degree of analytic attitude, and therefore a smaller illusion in subsequent practice, than training with the 120-degree figure. The main comparison was between the magnitude of the illusion following training with each of these figures. It confirms the prediction. Figure 8 shows that, with the exception of the first block of transfer trials for subjects judging the 60-degree figure, the curves for those who had trained with the 60-degree figure fall below the curves representing the subjects who had trained with the 120-degree figure.

From the preceding analysis it was not possible to tell whether both figures were influenced in the same manner by the initial training. Two further analyses were done in order to determine this They indicate that the differential influence of the training figure is more evident in those subjects whose subsequent practice was with the large-angled figure.

The trials x training figure interaction was significant for the subgroups whose subsequent practice was with the 120-degree figure. This interaction is of particular interest. It indicates that practice with the 120-degree figure leads to a greater decrement in the magnitude of the illusion when this practice follows training

with the 60-degree figure than when it follows training with the 120-degree figure. It appears that the analytic attitude established by training with a small-angled figure not only transferred to subsequent performance, but continued to influence the subjects' judgments throughout the series of 50 transfer trials.

Inspection of Figure 8 suggests that there is little (if any) transfer from the training with the 120-degree figure.

CHAPTER EIGHT

CONCLUSIONS AND DISCUSSION

In this final chapter the conslusions to be drawn from these experiments are outlined and their implications are discussed as they relate to attention and perceptual learning. The conclusions are limited to the particular experimental conditions and to the range within which specific parameters were varied.

Conclusions

1. The magnitude of the Müller-Lyer illusion is determined by three stimulus characteristics of the figure which were studied in these experiments:

(a) It is directly related to the length of the oblique lines. (Experiments 1 and 2)

(b) It is inversely related to the angle between the oblique lines. (Experiments 1, 3, and 5)

(c) It is inversely related to the prominence of the horizontal line. (Experiment 4)

2. The magnitude of the illusion decreases with practice. (Experiments 1, 2, 3, 4, and 5) The rate of this practice decrement is determined by certain stimulus characteristics of the figure:

(a) Rate of decrement is inversely related to the angle between the oblique lines. Reducing the size of this angle causes

a greater amount of decrement over a series of 100 trials. (Experiment 3)

(b) Rate of decrement is inversely related to the prominence of the horizontal line. A less prominent horizontal line produces greater decrement over a series of 100 trials. (Experiment 4)

(c) Rate of decrement is not related to the length of the oblique lines. (Experiment 2)

3. Training with a Müller-Lyer figure with a small angle between the oblique lines leads to a smaller illusion on subsequent practice with the same or a different figure. Training with a Müller-Lyer figure which has a large angle between the obliques has no significant effect on subsequent practice. (Experiment 5)

Discussion

The objective of this thesis was to determine the influence of certain stimulus characteristics of the Müller-Lyer figure on the magnitude of this illusion and on the practice decrement of the illusion. It was suggested that varying specific parameters of the figure might give some insight into the mechanism underlying the practice decrement.

The results of the first experiment serve as a much needed confirmation of earlier work on the relationship between two stimulus variables, length of the oblique lines and angle between them, and the magnitude of the illusion. Moreover, this experiment demonstrated that these two variables do not interact, but operate independently of

each other in determining the magnitude of the illusion.

The next three experiments indicate that two of the stimulus variables which affect the magnitude of the illusion are also important in determining how rapidly the illusion will decrease with practice. In experiments 3 and 4 the physical characteristics of the pattern which produced the greater amounts of illusion (small angles between the obliques and inconspicuous horizontal lines) led to the more rapid practice decrements. This was not the case, however, when the length of the oblique lines was varied. All four lengths led to the same marked decrement with practice. These results suggest that the three stimulus variables examined do not affect the magnitude of the illusion and its practice decrement in the same way. Had all three variables been related in the same way to both the magnitude and the decrement of the illusion (i.e., greater decrement under conditions that produce greater initial illusion), this would have suggested that a single factor might be responsible for both the magnitude and the decrement. However, the problem appears to be more complex than this.

Decreasing the length of the obliques, while weakening the illusory effect, does not seem to reduce the subject's attention to the figure, nor to change the probability of his developing an analytic attitude toward the task. The angle between the oblique lines in the figures used in Experiment 2 was 60 degrees. The curves for this experiment (Figure 5) all show a decrement similar to that for the 60-degree figure in the third experiment. It may be that this angle

results in a marked decrement with practice no matter what the length of the obliques is. Possibly the main factor in determining how readily the interference of the obliques is overcome with practice is the proximity of these lines to the horizontal lines.

Some important implications for perceptual learning are evident in the results of Experiments 3, 4, and 5. Perceptual learning theory will be briefly restated first, and these results will then be discussed in this context. In a very general sense, perceptual learning can be thought of as a change in the appearance of an object resulting from past experience. The theoretical statement which can best be applied to the present data is that of J. J. Gibson and E. J. Gibson (1955a; 1955b). Their proposal is that perceptual learning involves a progressive elaboration of the qualities and features of the visual world. Specific aspects of a stimulus become more readily differentiated from other aspects.

Let us assume that the illusion results from interference caused by the oblique lines, which distract the observer's attention from the end points of the extents being judged. It is proposed that, as practice proceeds, an analytic attitude is developed which leads to a reduction of the interference of the oblique lines. The term "analytic attitude" is used here to mean closer attention to the details of the stimulus. It involves the selectivity or narrowing of attention to the horizontal segments of the stimulus pattern. The

practice decrement is considered to be the result of an increased ability to discriminate the horizontal line from the interfering context. There is progressively less and less "confusion" between the obliques and the horizontal extents as the observer judges the figure in a series of trials. Under certain stimulus conditions (small angles and inconspicuous horizontal line) the task becomes more difficult and requires greater effort on the part of the observer to isolate the relevant parts of the figure. A need to pay close attention is induced by the interfering context. This increased attention gradually leads to more veridical perception of the stimulus. Factors other than the stimulus itself -- the subject's attitude or attention -- come into play when figures with small angles or inconspicuous horizontal lines are judged. Perception of certain stimulus configurations with less interfering contexts may be more stimulus bound. If distraction of attention is the mechanism producing the Müller-Lyer illusion, then it seems reasonable that close attention to the relevant features of the stimulus figure would reduce this interference, weakening the illusion.

It should be pointed out that the development of the analytic attitude appears to depend not just on the degree of interference from the oblique lines, but upon specific characteristics of the pattern -- closeness of the obliques to the horizontal line and prominence of the horizontal line. It will be recalled that the 1-cm. oblique lines in Experiment 2, which cause less interference than the longer obliques (i.e., smaller initial illusion), led to the same decrement as did the figures which

produce a large initial illusion. In addition, the amount of decrement for subjects who judged any specific configuration of the illusion pattern was uncorrelated with the initial magnitude, suggesting that the degree of improvement in this task is not simply a function of the amount of initial error.

Attention as a mechanism responsible for the decrement of the illusion with practice has been proposed by a number of investigators (Day, 1962; Judd, 1902; Ladd & Woodworth, 1911; Lewis, 1908; Seashore et al., 1908). The use of this concept has been based largely on suggestive evidence of an introspective nature. There appears to have been no empirical test of whether it is attention that is responsible for the practice decrement. Experiment 5 provides evidence which is consistent with such a mechanism. Training with a 60-degree figure had a marked effect on subsequent judgment of the Müller-Lyer figure. It seems plausible that a different attention habit was learned by subjects who trained with a small-angled figure than by those who trained with a large-angled pattern. It is proposed that the former group came to attend more closely to the horizontal line, gradually perceiving it more veridically, and that this increased attention is evidenced by the reduced illusion in practice trials following training with the small-angled figure.

This transfer effect in Experiment 5 appears to be due to something other than a "specific aptitude" with a single figure, as Ladd and Woodworth (1911) had proposed, or the presence of identical

elements in the two learning tasks. Had either of these been the reason for the transfer, training with the 60-degree figure should not have influenced the transfer trials with the 120-degree figure. The identical elements explanation of transfer phenomena states that the amount of transfer is directly related to the similarity of the two learning tasks. The greater transfer from the 60-degree figure to the 120-degree figure than from the 120-degree figure to itself is opposite to the expectations of this theory. Transfer through principles learned in a prior situation (i.e., their appropriate application to a new learning situation) appears to be a more adequate explanation for the results of this experiment. It is assumed that the principle operating here is the analytic attitude toward the task or the increased attention to details of the stimulus. The subject may not be aware of this transfer or of the influence of previous training (Lewis, 1908; Rudel & Teuber, 1963). Transfer of perceptual attitudes or ways of organizing visual information has been demonstrated in other perceptual tasks (Santos, et al., 1963; Vernon, 1962).

This discussion of attention gives little indication of the specific behavioral or central changes that occur when the appearance of the stimulus changes through experience. J. J. Gibson (1963) suggests that the basis for alterations in attention during perceptual learning is receptor adjustment aimed at obtaining maximum stimulation from the environment. He recognizes that the process must eventually be explained in physiological terms, but deliberately omits discussion of any physiological mechanism on the grounds that too little is known about "perceptual neurophysiology".

Peripheral explanations of this illusion based on receptor adjustment are not new. Changes in eye-movement patterns associated with viewing the figure a large number of times were used by Lewis (1908) to account for the practice decrement. Moed's finding that a decrement occurs when the figure is presented in the opposite orientation on alternate trials appears to be inconsistent with the eye-movement interpretation. Any pattern of eye-movements associated with one orientation of the figure would have to be reversed on the next trial. This continuous alternation would seem to preclude, or at least retard, the development of a specific eye-movement habit. Under certain conditions the decrement occurs when the subject fixates part of the figure or a point near the figure (Day, 1962; Köhler & Fishback, 1950a; Selkin & Wertheimer, 1957). This suggests that eye-movements may not be essential for the practice decrement to take place. Although changes in eye-movement may accompany changes in the appearance of the illusion pattern, either with age (Piaget & Lambercier, 1950) or with practice (Judd, 1905), it is not clear whether the modification of eye-movements is the result or the cause of changes in the appearance of the figure. This problem arises in connection with both the immediate illusion, which occurs upon first viewing the figure, and changes in its appearance with repeated judgments. At this point not enough is known about either the central or peripheral correlates of the perception of the Müller-Lyer illusion to indicate what the physiological mechanism might be.

The conclusions that can be drawn from experiments 2, 3 and 4 are limited to the decrement which occurs over 100 trials. There is some indication that a certain minimum number of trials may be necessary before the practice decrement becomes differentially affected by the stimulus characteristics of the pattern. No trials x angle interaction was found for the 30 trials of Experiment 1, nor for the first 50 trials of Experiment 3. However, the differential effect of angle did appear when 100 trials were administered.

The practice decrement of the Müller-Lyer illusion has been known for more than 60 years, but little progress has been made at understanding how this perceptual change occurs. Three experiments of this thesis have investigated the role played by the stimulus characteristics of the illusion figure. These fill a gap in the literature, since previous knowledge about the stimulus determinants of the practice decrement was very limited. Perhaps the most important finding in this series of experiments is that of the final experiment, which attempted to determine the mechanism responsible for this phenomenon.

Although these experiments have clearly shown the influence of certain stimulus variables on the practice decrement of the Müller-Lyer illusion, the findings are limited by the particular experimental conditions. A better understanding of the learning process and how it is influenced by changes along particular stimulus dimensions could be gained from investigating the decrement under conditions allowing for more extensive learning (e.g., several hundred trials). If the

magnitude of the illusion can be diminished by as much as one-half in 100 trials, as it was in one condition (1-cm. oblique lines in Experiment 2), then it would seem safe to predict a decrease to near zero in three or four such practice sessions. On the other hand, an asymptote may be reached before the illusion disappears. Although there is no direct evidence of an asymptote in the present experiments, the curves of Figure 6 (decrement with different angles) come close together on the last few blocks of trials. Whether the amount of illusion produced by small-angled figures would decrease below that of the larger-angled figures remains an empirical question.

Presentation of a larger number of trials would have to be done in a series of daily sessions, as Judd (1902; 1905) and Lewis (1908) did. This raises the question of whether the analytic attitude developed within a single session would retain its effect over a 24-hour period. Perhaps certain configurations of the illusion produce a more enduring analytic attitude than others. This could be assessed by a procedure like that of Experiment 5, measuring transfer effects over different periods of time. Such an investigation would have implications for the permanence of the mechanism underlying the practice decrement.

Experiment 5 has provided suggestive evidence that changes in attention caused the practice decrement of the Müller-Lyer illusion. Additional relevant evidence could be obtained by repeating Experiment 5, varying the saliency of the horizontal line instead of the angle between the obliques. Training with a light gray horizontal would be expected to have greater influence on subsequent practice than

would training with a figure having a black horizontal. If the explanation proposed for the uniform effect of different lengths of the obliques (Experiment 2) on the practice decrement is correct, then manipulating this variable in a similarly designed experiment ought to show training with short obliques and long obliques to have the same effect on subsequent practice.

Attention to the horizontal segment of the figure has been considered important in determining the practice decrement. This may be accomplished by the use of specific instructions. Objective instructions should lead to a greater decrement over a series of trials than instructions to judge the figure as it appears.

These are some of the experiments which this research indicates ought to be done in order to provide a better understanding of the practice decrement of the Müller-Lyer illusion.

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APPENDICES

APPENDIX A

RAW DATA FOR EXPERIMENT 1

GROUP I - 30-DEGREE ANGLE WITH 1-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	1	9	6	8	11	6	8	-2	10	7
2	9	12	3	9	0	0	11	7	3	3
3	1	3	4	14	8	3	18	2	3	5
4	1	5	5	12	-2	5	14	-3	4	4
5	-1	8	7	10	6	3	10	6	3	10
6	-1	11	7	10	-2	-2	11	5	6	8
7	-3	7	7	17	3	6	11	6	9	5
8	12	7	10	14	4	7	17	3	8	7
9	4	6	8	11	0	-1	6	7	3	4
10	-1	6	7	19	4	2	11	2	5	9
11	9	6	7	15	-1	4	13	8	10	7
12	5	2	11	24	0	-2	14	6	3	8
13	5	0	8	12	2	0	11	7	4	1
14	9	4	11	12	4	6	13	7	5	6
15	3	4	10	23	6	6	11	4	8	5
16	3	4	8	15	4	5	11	0	6	10
17	10	3	12	12	5	0	9	3	2	6
18	3	-3	10	26	-1	4	9	1	6	12
19	4	0	5	7	0	1	11	0	5	14
20	5	1	5	12	0	5	14	7	5	4
21	9	-1	4	14	3	8	14	5	5	10
22	7	6	9	15	8	3	10	6	10	11
23	-3	1	9	23	3	1	10	6	5	6
24	5	1	4	7	-2	5	8	1	8	5
25	-3	7	7	10	6	-2	12	6	2	9
26	3	8	6	12	1	-3	13	2	6	-2
27	5	5	4	9	6	2	13	6	6	8
28	1	8	3	9	8	3	14	1	4	7
29	7	9	6	10	3	2	10	1	7	5
30	4	3	8	6	-2	2	13	5	7	8

GROUP II - 30-DEGREE ANGLE WITH 2-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	5	13	20	17	10	3	23	1	7	4
2	15	9	4	14	10	6	13	8	8	4
3	10	12	10	11	11	9	13	12	3	3
4	13	18	10	13	8	5	11	13	-1	5
5	20	19	8	11	3	9	14	11	1	3
6	10	11	8	12	2	6	20	5	1	8
7	9	13	7	9	5	8	12	8	3	5
8	12	16	2	13	-1	8	8	8	4	6
9	16	5	3	15	-3	11	11	10	6	4
10	14	5	13	14	1	6	11	6	8	4
11	14	8	7	13	3	2	8	6	7	-2
12	12	8	6	11	0	6	16	4	6	2
13	10	5	-1	11	1	10	15	7	8	6
14	7	16	13	14	5	5	15	4	8	6
15	5	5	5	12	1	6	9	7	7	1
16	15	18	8	13	0	7	7	10	5	2
17	11	3	6	11	3	6	8	7	8	3
18	6	15	-3	12	0	8	9	11	7	5
19	11	2	7	14	3	10	13	7	-5	8
20	12	15	1	12	1	6	10	3	5	7
21	7	5	3	8	2	2	11	4	11	1
22	10	12	-1	11	4	3	5	4	6	8
23	14	4	4	9	1	8	3	1	-3	6
24	4	12	-1	10	7	5	6	-2	2	6
25	13	10	6	10	0	5	2	-3	2	11
26	7	13	4	8	6	3	-1	6	12	7
27	8	11	-4	11	3	5	3	16	9	7
28	13	8	4	8	4	5	-2	6	4	8
29	6	5	10	8	3	2	0	14	8	7
30	9	8	1	11	3	2	6	24	6	6

GROUP III - 30-DEGREE ANGLE WITH 3-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	12	18	1	11	5	12	25	16	11	7
2	11	23	8	10	12	12	19	13	10	5
3	5	24	6	12	8	17	21	8	11	6
4	3	23	8	9	12	9	22	16	11	5
5	4	24	5	4	12	11	22	10	12	-1
6	3	25	8	11	12	11	13	9	6	-5
7	4	23	7	6	13	11	15	14	2	2
8	6	21	6	10	15	9	20	15	2	5
9	7	22	5	2	17	7	19	14	11	4
10	7	21	8	3	16	6	22	8	4	-2
11	10	19	4	10	21	11	17	9	5	2
12	5	22	5	8	17	9	23	8	11	5
13	7	16	7	8	17	10	12	11	3	-2
14	6	22	0	4	19	7	20	10	1	8
15	5	21	4	8	18	10	16	10	16	9
16	7	16	6	6	18	7	13	9	9	10
17	6	20	9	7	18	9	23	13	6	-6
18	7	17	8	1	16	4	20	10	15	-1
19	5	13	9	-2	17	2	12	10	8	11
20	5	14	2	1	18	6	13	10	10	3
21	4	20	4	3	17	8	16	11	10	0
22	6	21	4	2	15	10	22	13	9	2
23	6	22	11	8	19	11	14	14	9	3
24	4	14	9	4	17	11	17	14	7	-4
25	4	16	10	5	15	11	13	12	8	5
26	1	20	9	3	15	12	16	13	14	4
27	7	21	8	2	17	9	21	19	13	0
28	0	20	7	4	20	6	12	11	11	-2
29	2	17	7	4	18	7	17	8	16	3
30	2	17	11	2	17	10	12	9	9	-6

GROUP IV - 30-DEGREE ANGLE WITH 4-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	13	15	25	15	15	8	27	21	8	9
2	10	21	21	12	14	8	20	9	11	13
3	12	22	20	17	13	9	17	4	8	17
4	10	23	25	13	17	10	21	6	4	14
5	10	16	18	10	15	8	21	5	6	14
6	9	12	20	13	17	5	14	9	4	10
7	12	12	19	10	12	9	14	9	8	12
8	12	17	19	8	6	10	12	2	9	11
9	14	14	18	10	10	6	17	12	12	11
10	16	16	18	8	14	8	16	9	10	11
11	14	15	24	6	15	9	14	11	7	12
12	12	7	19	9	10	6	19	12	6	11
13	14	12	19	5	9	7	16	12	5	12
14	13	8	20	10	11	9	16	14	12	11
15	12	10	18	8	8	8	20	17	9	10
16	15	17	20	9	4	8	16	10	10	13
17	11	15	19	8	6	9	14	4	9	14
18	11	8	19	6	7	9	15	9	13	7
19	9	10	15	8	4	8	11	13	11	10
20	10	9	20	4	7	8	16	10	8	14
21	14	14	18	8	11	11	11	11	13	13
22	12	15	19	10	8	10	13	10	11	11
23	13	11	18	8	8	8	18	14	9	13
24	16	13	16	10	8	6	14	7	13	11
25	10	17	16	9	8	7	15	10	12	18
26	14	14	17	8	8	8	16	12	13	14
27	12	15	19	5	5	6	12	13	4	11
28	10	19	19	10	9	7	10	14	8	8
29	14	15	20	12	8	7	13	11	7	10
30	11	18	18	12	4	6	13	14	9	10

GROUP V - 60-DEGREE ANGLE WITH 1-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	9	7	3	4	9	12	8	13	3	5
2	4	6	11	0	12	11	8	11	3	9
3	10	8	5	6	3	10	8	8	2	7
4	7	8	7	6	4	10	8	10	3	8
5	6	10	9	4	1	11	11	10	6	12
6	10	5	10	5	1	4	8	7	3	9
7	9	2	11	7	1	2	11	11	7	10
8	6	6	12	0	4	0	12	6	-1	11
9	7	6	5	10	4	7	6	9	4	10
10	10	4	6	3	8	3	6	13	2	8
11	2	5	11	12	-1	2	8	10	6	8
12	1	0	0	7	5	4	12	9	4	11
13	6	4	6	5	6	4	6	9	4	10
14	4	8	9	6	2	7	10	8	8	11
15	4	5	5	7	8	2	8	6	6	4
16	11	3	1	5	7	2	8	6	2	10
17	6	0	6	10	4	5	8	6	5	4
18	7	4	6	2	7	5	4	8	6	9
19	4	11	6	2	7	-4	7	9	6	6
20	5	9	8	4	5	2	11	7	3	7
21	3	2	9	7	8	2	7	4	1	4
22	7	-3	4	10	6	0	5	8	2	7
23	7	2	6	9	8	-1	9	9	5	9
24	4	4	14	7	8	2	7	9	4	3
25	7	1	11	7	6	3	9	5	3	12
26	10	1	6	3	7	2	7	10	4	9
27	4	6	5	7	9	4	5	9	4	2
28	5	1	7	3	9	1	6	11	5	4
29	3	6	13	1	0	-2	7	6	6	7
30	9	2	7	1	2	7	8	6	7	12

GROUP VI - 60-DEGREE ANGLE WITH 2-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	2	6	6	15	13	5	13	14	13	4
2	2	6	-4	13	11	13	13	13	16	5
3	10	8	-3	7	0	11	11	19	13	1
4	5	10	0	13	2	11	9	14	19	0
5	3	6	-2	9	-2	10	4	15	11	-2
6	6	6	-2	10	3	10	0	10	9	3
7	6	8	0	10	3	7	2	9	11	0
8	6	9	-1	8	5	3	5	11	11	6
9	6	7	1	11	1	6	7	12	9	2
10	10	7	1	11	-2	4	7	11	9	-7
11	4	4	3	10	-1	7	7	10	10	6
12	1	4	1	12	1	2	3	10	11	4
13	5	5	3	10	2	12	4	11	11	0
14	4	10	0	10	2	5	8	15	9	5
15	2	9	4	7	2	9	10	11	8	3
16	3	3	-1	6	3	6	5	9	7	-3
17	4	10	1	9	0	4	7	14	10	0
18	2	7	4	8	7	8	0	11	11	4
19	-1	10	6	9	4	6	5	15	10	3
20	2	11	1	16	7	7	6	15	12	4
21	2	8	2	11	7	-1	0	10	7	5
22	6	8	2	10	6	-4	5	11	9	5
23	4	10	4	13	7	1	13	13	12	1
24	3	9	6	11	5	9	13	11	9	-1
25	3	10	3	12	6	12	9	13	11	-1
26	4	10	4	13	8	10	16	12	10	-1
27	-1	10	1	13	6	3	13	12	6	10
28	5	6	3	17	7	3	17	9	11	1
29	6	6	4	12	6	9	15	9	8	-1
30	7	6	5	10	3	5	15	11	14	1

GROUP VII - 60-DEGREE ANGLE WITH 3-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	8	13	8	15	21	12	21	12	14	4
2	7	14	9	13	16	9	16	4	11	3
3	4	12	10	13	21	5	22	2	13	6
4	3	13	13	15	20	11	16	7	14	2
5	3	16	9	11	12	10	17	9	14	4
6	2	15	12	14	9	9	2	4	13	3
7	0	14	13	16	15	10	7	11	9	6
8	-3	16	5	11	8	10	7	6	14	8
9	1	17	10	13	12	10	7	8	9	10
10	-3	19	6	11	7	10	13	4	14	8
11	-5	19	7	14	1	5	5	15	8	6
12	-4	9	8	9	9	6	9	7	7	6
13	-3	18	4	4	12	7	6	14	7	4
14	2	20	5	4	14	5	7	11	6	4
15	-3	22	8	8	11	7	9	10	7	7
16	-5	18	7	10	10	8	6	15	6	4
17	-3	19	5	7	11	14	9	18	7	7
18	0	19	4	8	12	5	5	15	9	7
19	0	11	5	14	9	9	10	10	7	4
20	-1	19	-4	15	8	13	9	14	10	4
21	-1	4	9	12	12	7	13	13	13	0
22	1	10	6	13	10	9	8	13	6	3
23	-4	16	-1	12	5	9	10	9	8	1
24	-4	11	7	14	7	8	5	15	8	0
25	2	10	-1	15	7	10	9	9	6	0
26	-3	12	2	13	12	9	7	16	3	-2
27	-7	15	2	16	14	9	6	13	9	0
28	-9	11	1	14	10	6	6	6	13	5
29	-7	13	0	14	4	5	8	17	11	3
30	2	14	5	11	3	5	12	11	11	1

GROUP VIII -60-DEGREE ANGLE WITH 4-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	15	14	10	15	11	18	15	20	18	14
2	13	5	7	12	0	11	16	5	9	6
3	11	6	10	10	4	13	12	5	11	20
4	11	4	8	8	8	14	9	8	13	19
5	14	6	6	10	8	10	8	11	9	10
6	9	8	3	14	13	16	9	7	11	10
7	11	7	5	14	3	10	11	11	16	9
8	9	7	6	9	5	4	13	7	15	9
9	13	3	8	11	3	11	10	2	17	14
10	17	-1	5	13	0	11	12	15	14	18
11	12	0	4	10	3	10	11	4	13	11
12	9	2	6	8	5	12	14	9	10	14
13	14	-1	7	8	5	16	14	6	19	5
14	7	0	7	9	2	13	16	11	9	-2
15	6	-6	6	10	7	13	16	3	20	20
16	10	-2	7	11	7	6	10	4	14	6
17	10	-2	8	4	4	11	11	5	15	3
18	13	-3	8	11	8	9	10	4	18	9
19	11	-6	6	4	0	9	11	1	14	4
20	13	-1	5	9	4	11	15	5	10	5
21	7	-3	7	7	4	13	17	7	19	4
22	13	1	6	11	0	7	10	6	4	7
23	11	-7	8	8	0	11	9	3	15	4
24	13	-5	4	9	4	10	7	10	8	11
25	14	0	6	9	3	6	10	9	11	3
26	8	1	5	10	2	7	10	7	16	10
27	6	-4	7	9	5	8	9	4	13	3
28	10	-1	9	10	4	7	11	8	10	1
29	11	-1	8	12	4	10	10	12	10	11
30	7	4	9	13	3	9	11	5	9	10

GROUP IX - 90-DEGREE ANGLE WITH 1-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	5	6	11	9	0	5	12	9	-1	9
2	8	6	7	13	8	4	15	5	5	4
3	4	10	7	7	7	0	12	11	1	2
4	7	10	7	7	-3	6	12	8	5	2
5	6	6	11	6	8	10	10	10	6	5
6	3	9	8	5	8	7	10	9	4	6
7	3	5	11	4	0	6	9	9	1	5
8	7	6	7	5	4	10	7	11	0	3
9	6	6	3	6	5	10	9	6	1	8
10	4	10	11	4	2	4	11	-6	2	8
11	6	6	5	7	1	7	10	-3	0	8
12	6	2	7	9	8	9	9	-7	2	4
13	6	5	6	1	1	7	7	5	4	5
14	6	4	0	-1	5	6	10	-13	2	6
15	9	3	9	-2	2	9	9	1	3	4
16	7	5	6	2	3	6	10	-14	4	6
17	4	4	4	-1	7	4	8	-4	3	2
18	6	5	8	2	0	7	9	5	4	4
19	7	5	3	2	5	8	7	5	1	2
20	9	4	8	4	5	1	2	7	0	5
21	7	3	5	1	7	6	11	3	0	6
22	7	2	4	2	7	4	0	5	5	2
23	8	4	5	0	10	6	6	10	1	2
24	14	3	4	-1	9	5	5	10	1	1
25	6	3	9	1	1	1	8	10	3	5
26	7	7	6	2	-2	5	1	8	-2	3
27	4	5	2	0	2	6	0	10	3	9
28	3	6	7	3	6	2	15	-1	4	7
29	5	3	11	1	4	4	7	5	-2	6
30	3	5	1	1	3	3	10	5	2	10

GROUP X - 90-DEGREE ANGLE WITH 2-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	15	16	1	5	9	2	18	4	11	10
2	4	15	1	2	10	7	5	9	9	9
3	9	4	3	2	12	0	6	8	13	8
4	2	13	2	2	9	6	10	8	9	5
5	3	7	0	4	14	0	8	10	14	7
6	5	1	0	3	6	2	17	9	14	5
7	4	4	3	4	11	-3	8	10	15	8
8	3	8	5	-1	7	3	5	11	9	7
9	6	-1	4	7	12	-1	7	10	11	5
10	5	4	3	3	9	8	9	9	8	2
11	1	0	0	-3	15	-2	8	14	13	4
12	6	-2	-2	5	9	-1	3	9	8	4
13	5	1	2	6	4	5	13	12	11	2
14	6	3	3	3	9	6	13	7	9	3
15	4	4	0	7	8	3	8	9	11	5
16	-3	7	-3	5	7	0	5	7	10	1
17	5	4	-7	1	10	-1	9	12	10	1
18	4	2	1	6	10	5	11	15	6	6
19	4	3	-5	2	10	3	14	15	13	1
20	5	2	-2	1	9	2	10	15	10	6
21	5	5	2	-1	8	3	13	17	13	4
22	4	3	-6	-4	6	2	8	14	18	4
23	2	-1	-4	7	15	0	2	13	15	3
24	5	-2	-3	0	10	2	12	8	14	1
25	5	2	-1	1	9	2	6	7	10	4
26	6	-1	-2	-1	8	-9	11	8	10	1
27	6	2	1	10	13	-5	7	10	10	5
28	3	-3	1	9	11	-2	1	12	8	2
29	5	1	-4	7	10	-1	4	15	6	3
30	7	-2	-3	3	13	-8	23	9	9	4

GROUP XI - 90-DEGREE ANGLE WITH 3-CM. OBLIQUES

MILLIMETRES OF ILLUSION

SUBJECTS

Trials	Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	8	10	13	20	15	7	12	24	6	-1
2	7	10	7	27	15	7	14	10	8	12
3	11	11	5	19	11	7	12	7	7	11
4	7	12	8	22	11	2	10	15	14	13
5	7	8	8	12	12	2	16	18	4	6
6	10	12	8	18	11	1	13	14	13	0
7	8	13	5	17	9	10	12	6	11	13
8	12	13	0	14	10	8	12	9	16	8
9	8	10	6	17	10	1	9	10	14	9
10	9	12	2	10	11	14	9	7	15	5
11	11	11	9	9	12	7	10	12	1	6
12	9	9	12	13	8	4	9	14	-3	10
13	7	9	11	14	9	9	7	3	13	10
14	8	17	8	13	9	11	8	7	17	11
15	9	16	10	19	2	5	8	14	-2	8
16	11	16	7	17	-3	6	10	10	-8	8
17	11	9	8	12	10	7	12	11	15	9
18	10	9	4	16	-3	8	8	8	15	6
19	6	14	9	12	5	10	14	9	-6	12
20	6	11	10	18	0	12	12	11	18	12
21	8	11	15	11	1	9	12	13	20	12
22	9	12	15	12	4	15	13	8	-8	11
23	7	13	10	22	3	11	9	11	-5	17
24	5	8	9	19	5	4	15	14	-3	6
25	7	14	15	10	2	7	11	10	2	10
26	0	10	7	7	10	8	3	11	1	12
27	6	12	11	14	-8	4	9	6	-4	15
28	3	12	9	18	2	-3	4	15	-2	8
29	4	17	16	17	2	1	15	10	16	12
30	4	12	11	21	3	7	3	15	13	8

GROUP XLL - 90-DEGREE ANGLE WITH 4-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	19	15	9	6	9	5	13	8	4	1
2	21	14	8	8	-4	18	12	10	5	4
3	15	11	10	5	8	8	9	9	7	4
4	5	11	4	14	13	13	10	7	4	2
5	7	7	7	7	12	9	15	8	2	3
6	11	12	3	9	11	7	9	10	4	2
7	12	6	7	9	9	10	7	10	9	0
8	6	11	6	15	6	13	13	15	8	7
9	11	12	3	10	5	17	7	11	3	8
10	7	8	5	10	11	14	3	11	5	10
11	8	11	5	6	6	10	7	9	9	2
12	13	9	7	4	13	10	9	13	13	3
13	6	11	3	12	15	13	9	9	4	6
14	4	11	4	8	10	14	13	10	7	-2
15	10	11	4	8	5	14	5	7	6	-2
16	7	10	3	9	7	16	3	1	16	7
17	8	12	2	8	4	11	7	8	7	-1
18	9	11	1	12	9	12	17	8	7	2
19	14	10	3	13	6	10	6	11	14	8
20	12	12	4	6	4	13	7	12	8	11
21	11	8	7	10	2	11	1	13	11	6
22	12	7	2	10	2	10	10	15	9	4
23	5	8	4	14	3	12	5	13	13	4
24	6	9	6	17	7	11	9	12	5	3
25	6	10	0	10	7	6	12	14	1	11
26	8	11	0	9	4	10	7	13	5	7
27	6	9	1	10	2	8	10	16	5	0
28	3	8	0	11	11	9	13	14	9	9
29	7	10	0	9	4	5	15	14	4	6
30	9	6	4	6	10	9	12	14	4	5

GROUP XIII - 120-DEGREE ANGLE WITH 1-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	3	3	9	0	2	1	5	-1	13	0
2	6	4	8	-1	2	1	9	6	8	-1
3	-4	5	6	-2	3	5	8	-2	3	0
4	5	2	7	-3	3	4	7	-1	3	1
5	6	4	6	-1	0	0	8	2	2	7
6	3	3	6	1	2	4	3	5	2	0
7	5	5	9	3	6	4	12	1	5	2
8	0	7	4	3	2	7	13	1	3	1
9	2	7	4	1	0	7	6	0	4	2
10	-1	2	5	-4	3	1	11	1	4	3
11	4	4	7	9	0	4	6	1	4	2
12	2	2	4	5	-3	4	2	0	2	1
13	3	3	5	1	-3	4	1	3	3	0
14	1	7	3	5	6	2	7	1	4	2
15	0	1	4	3	2	5	4	3	8	0
16	5	2	3	4	-3	1	1	4	7	1
17	2	8	3	5	-3	10	10	0	4	3
18	4	3	7	6	4	2	1	-2	4	-3
19	0	6	4	4	-4	4	5	-4	3	2
20	3	3	4	4	0	-2	9	-2	3	0
21	4	4	3	3	-1	8	7	-2	4	1
22	3	2	1	9	-3	1	6	-3	3	2
23	2	3	3	2	-1	-6	17	-5	4	2
24	1	6	6	4	2	7	6	-5	7	0
25	5	5	4	4	-3	2	7	-4	5	2
26	4	2	2	8	-5	11	4	-4	4	5
27	2	6	-1	2	4	3	8	-2	8	1
28	5	4	4	8	5	7	1	-6	9	1
29	5	1	5	0	-4	9	6	-2	6	3
30	5	3	4	3	0	3	6	-3	5	2

GROUP XIV - 120-DEGREE ANGLE WITH 2-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	3	9	9	4	7	4	16	7	10	2
2	6	4	3	4	5	3	9	15	11	6
3	4	7	5	2	4	3	13	13	13	4
4	3	12	-2	5	5	5	7	15	15	6
5	4	6	5	6	3	-1	11	9	12	6
6	6	8	3	7	2	5	10	7	15	8
7	4	12	3	6	-1	4	7	8	11	8
8	0	6	0	7	2	3	9	9	12	7
9	3	6	8	8	7	8	4	9	15	6
10	5	12	5	5	5	7	6	2	11	6
11	5	7	8	7	4	-2	9	6	15	2
12	2	2	2	3	8	-1	7	6	12	3
13	1	3	4	4	6	1	5	9	9	4
14	6	8	7	6	6	-1	9	6	13	6
15	3	4	9	6	9	5	8	7	12	6
16	1	2	12	7	6	5	8	10	12	5
17	8	7	4	7	5	5	6	7	9	9
18	8	5	8	7	7	3	10	11	15	2
19	4	5	3	2	5	-2	7	8	12	2
20	1	7	-3	7	6	6	11	9	12	3
21	0	0	5	6	4	1	6	12	12	5
22	5	1	3	5	0	3	12	7	11	5
23	3	1	3	5	6	6	8	9	8	2
24	5	7	-3	7	7	3	8	7	4	8
25	-2	4	-3	6	5	5	10	9	8	7
26	2	4	-5	6	7	3	8	3	8	2
27	3	1	4	6	6	2	10	9	8	3
28	11	2	2	5	3	5	10	10	9	5
29	1	10	5	3	1	3	10	7	6	2
30	4	4	3	4	4	9	6	7	6	1

GROUP XV - 120-DEGREE ANGLE WITH 3-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: Male						Female			
	1	2	3	4	5	6	7	8	9	10
1	15	7	3	9	4	1	5	11	7	2
2	13	9	6	6	1	3	11	15	11	-1
3	12	7	4	5	8	4	3	13	10	9
4	4	7	5	8	5	4	9	12	7	-2
5	8	10	6	2	2	5	9	7	11	-1
6	6	5	7	6	6	7	16	8	7	3
7	9	6	7	10	7	4	8	10	1	4
8	9	10	4	7	2	9	6	14	3	8
9	12	10	5	6	1	10	11	11	10	10
10	9	3	7	8	4	8	10	12	2	5
11	11	12	7	7	6	11	2	11	1	9
12	10	10	4	3	3	10	5	10	1	6
13	8	0	1	6	3	7	5	7	2	6
14	7	1	-1	4	5	9	16	7	8	3
15	13	-1	4	-2	2	3	14	9	5	7
16	10	1	5	0	-2	2	8	3	7	11
17	11	-1	5	7	2	6	-1	7	9	2
18	14	-5	6	6	4	-2	11	4	10	7
19	10	-2	3	5	-1	0	10	7	5	5
20	14	6	4	5	1	4	10	7	6	4
21	6	6	5	9	2	2	12	4	6	6
22	9	7	3	2	0	6	8	11	11	5
23	7	2	0	3	0	11	-3	5	5	5
24	4	1	5	3	2	4	4	3	4	5
25	7	5	5	4	1	3	12	6	10	2
26	2	7	3	6	2	2	0	7	5	7
27	2	6	7	7	-1	9	13	11	12	6
28	5	6	5	3	-5	12	7	13	4	5
29	8	3	9	1	-1	4	4	5	6	4
30	5	5	7	5	-2	3	7	7	6	-2

GROUP XVI - 120-DEGREE ANGLE WITH 4-CM. OBLIQUES

MILLIMETRES OF ILLUSION

Trials	Subjects: MALE						FEMALE			
	1	2	3	4	5	6	7	8	9	10
1	11	9	12	12	1	8	10	11	-2	15
2	13	11	8	11	2	5	13	9	-2	13
3	14	14	4	15	5	5	12	13	-1	10
4	13	5	7	15	4	10	12	8	10	14
5	8	6	13	6	3	1	13	11	8	9
6	10	10	8	5	5	2	11	10	11	13
7	11	8	2	10	4	4	10	10	0	13
8	18	7	6	12	5	3	13	10	3	10
9	13	9	7	11	6	2	10	9	1	11
10	18	7	6	9	5	1	15	8	13	10
11	12	6	10	6	7	3	8	4	1	11
12	11	5	5	11	6	0	14	4	9	10
13	9	6	9	11	3	-2	12	9	8	10
14	10	6	10	4	7	0	0	7	10	12
15	11	7	11	3	6	4	5	9	12	14
16	7	5	9	8	6	0	7	8	4	4
17	13	2	11	7	5	2	2	7	7	10
18	5	8	11	7	-1	-1	2	6	4	10
19	4	4	9	12	6	0	2	8	13	8
20	13	5	9	10	0	0	-5	7	8	6
21	17	5	4	9	5	-4	3	7	9	9
22	9	5	4	12	4	0	0	10	8	8
23	13	6	8	11	5	0	-9	10	6	12
24	12	3	6	13	6	1	-9	7	9	10
25	11	5	10	15	5	5	5	6	12	5
26	8	6	13	15	0	0	1	8	7	4
27	8	2	13	11	1	-6	0	10	8	8
28	9	0	6	7	0	-6	-4	7	9	13
29	11	4	10	4	6	-6	-10	9	10	6
30	10	-2	10	3	-2	2	6	4	7	12

APPENDIX B

RAW DATA FOR EXPERIMENT 2

GROUP I - 1 CM. OBLIQUE LINES

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	15	6	13	6	9	12	9	16	18	14	17	19	15	15	12	14	13	12	14	16
	2	16	14	11	14	12	13	13	13	10	8	9	10	7	9	16	9	11	11	5	10
	3	5	4	6	7	7	8	11	8	3	6	6	1	5	6	6	5	8	10	7	11
	4	15	18	13	14	12	10	1	9	-1	11	13	3	10	13	6	15	10	4	1	3
	5	14	11	5	14	9	12	14	9	7	12	11	6	16	20	10	12	7	18	16	12
	6	13	13	12	12	12	10	12	7	9	9	12	9	7	4	10	7	9	8	9	7
	7	8	9	10	7	13	15	8	11	14	11	9	10	8	8	12	12	13	9	11	15
	8	10	10	5	14	10	15	14	11	13	12	13	14	13	12	12	15	9	13	8	6
	9	12	12	14	13	10	11	10	9	10	16	13	11	10	11	7	10	9	10	8	8
	10	15	14	1	15	16	12	12	15	3	5	9	6	7	8	15	14	5	11	15	17
Female	11	8	10	10	11	9	13	11	9	14	18	13	7	12	10	9	10	13	14	15	11
	12	14	14	10	13	6	13	12	5	11	5	18	4	1	7	5	3	3	1	3	4
	13	16	4	6	6	0	7	3	3	4	4	2	-2	-4	1	8	3	-6	-4	0	-1
	14	10	7	11	11	8	10	7	7	10	10	10	9	9	14	8	13	2	8	11	6
	15	6	8	7	11	3	7	9	3	15	4	13	13	20	1	2	11	15	6	4	6
	16	7	6	4	7	7	8	9	9	12	4	4	8	11	4	2	5	9	5	8	6
	17	10	3	15	8	4	8	7	7	4	7	8	5	3	6	3	7	4	3	8	3
	18	14	10	10	6	9	8	11	15	14	12	11	14	15	14	10	7	11	8	13	11
	19	7	2	7	8	9	2	10	9	8	8	5	10	7	9	5	2	0	3	2	3
	20	15	7	6	5	13	8	7	7	7	1	5	7	6	6	5	7	5	7	4	3

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	18	9	12	20	9	4	9	9	11	11	10	10	10	14	14	11	7	4	7	15
	2	8	10	9	11	8	8	11	9	10	10	7	8	9	12	11	6	6	13	7	8
	3	9	5	8	5	11	12	10	7	7	11	10	6	7	6	9	6	6	8	6	7
	4	3	10	4	-3	15	10	-5	6	4	2	2	1	11	-1	5	2	2	-4	4	7
	5	8	12	10	14	12	19	19	12	11	9	14	7	8	5	2	4	7	18	26	15
	6	11	11	8	6	15	12	11	8	7	6	10	6	7	10	8	4	10	5	6	11
	7	13	14	12	11	10	15	15	14	12	13	13	12	18	12	10	12	10	10	8	11
	8	7	10	13	10	10	10	12	8	10	5	6	5	11	13	13	10	12	12	11	10
	9	13	11	6	6	5	13	7	3	6	10	8	11	5	7	8	10	10	9	12	12
	10	9	12	16	9	11	7	7	11	7	9	11	10	15	16	8	7	5	10	15	13
Female	11	10	12	11	6	9	12	11	12	10	12	9	13	9	3	11	12	8	13	11	12
	12	6	13	4	-3	9	8	3	13	5	0	4	5	9	7	1	2	6	8	5	5
	13	-4	2	3	1	1	6	4	3	4	9	4	5	4	5	4	9	11	2	3	3
	14	10	16	9	12	13	7	6	11	10	1	5	7	2	-5	4	7	10	6	9	8
	15	8	15	14	7	13	8	17	12	5	16	7	12	14	11	13	7	2	8	7	7
	16	9	1	6	8	1	6	7	3	4	5	4	6	1	9	-3	7	5	4	5	5
	17	4	2	3	-1	3	2	-3	6	5	1	-1	-3	-6	8	-7	0	4	0	-3	2
	18	8	13	6	8	7	12	8	5	10	1	16	11	6	9	16	6	7	11	11	15
	19	2	2	3	1	2	1	6	3	1	8	9	2	2	-1	5	1	-1	3	5	3
	20	2	-1	2	1	0	2	-4	4	1	3	1	-1	4	-1	1	-4	-2	-5	-5	12

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	9	11	15	13	14	4	11	13	12	14	13	7	11	16	9	14	8	17	10	15
	2	11	7	10	9	10	6	7	5	10	7	7	10	10	12	12	17	9	7	10	7
	3	9	7	2	6	6	5	4	5	7	7	8	6	6	6	8	7	11	6	5	7
	4	5	8	3	10	1	12	-1	-6	3	6	2	3	1	-5	9	1	-2	-1	-8	2
	5	20	11	8	4	15	20	6	8	4	16	17	19	10	14	6	19	12	15	14	17
	6	6	10	10	5	7	5	6	10	10	13	7	7	5	6	7	8	7	9	5	8
	7	13	12	11	11	13	11	10	12	12	13	9	8	8	11	8	10	10	8	9	8
	8	11	13	14	13	12	11	11	5	8	13	11	11	10	11	10	11	12	14	12	10
	9	12	11	12	11	12	11	6	6	5	3	8	4	6	4	3	5	3	6	4	5
	10	15	4	7	5	11	10	11	14	8	15	12	14	9	12	9	12	13	13	11	8
Female	11	8	13	11	11	14	10	11	13	12	16	8	11	12	11	8	11	7	11	7	8
	12	4	6	4	2	3	8	-1	3	-3	-13	-5	-1	-6	-2	-10	7	-7	1	-6	1
	13	3	1	1	0	5	2	2	11	6	4	-1	4	0	6	-5	4	2	2	4	0
	14	12	12	8	5	1	9	10	3	13	4	8	7	13	9	11	0	5	0	3	1
	15	10	4	8	11	12	11	15	11	12	10	7	3	13	9	10	16	12	8	4	12
	16	3	3	7	7	8	7	8	4	6	2	5	10	3	8	6	8	8	7	3	6
	17	6	-5	0	5	-6	-2	-4	2	-4	1	1	-4	1	3	1	-8	0	10	-1	1
	18	6	14	11	12	14	8	13	10	10	10	10	11	8	11	10	10	7	6	4	10
	19	5	6	4	6	8	1	5	0	7	9	3	7	8	9	4	4	5	2	4	5
	20	0	-2	-3	-3	-6	-2	-2	0	5	-2	-6	-7	-5	-10	-5	-9	-7	-6	-4	-4

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																	
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	9	13	12	10	14	16	10	3	9	9	7	13	8	10	18	14	9	12	7	11
	2	11	13	8	10	11	8	10	10	8	7	10	10	12	10	12	8	6	10	10	12
	3	9	4	7	6	7	6	5	2	0	6	8	3	6	4	7	2	4	2	3	8
	4	3	5	-7	3	2	4	1	-5	6	2	6	3	3	-5	-2	-6	-9	-7	-5	-8
	5	9	6	14	7	21	10	-2	19	3	8	16	5	16	11	7	12	14	16	7	5
	6	6	9	7	7	7	6	8	7	12	6	9	7	5	7	8	1	6	3	3	7
	7	7	8	17	10	10	9	8	14	9	10	12	11	9	11	13	6	10	12	8	7
	8	15	8	12	5	11	10	8	14	11	10	13	5	8	12	15	13	12	11	10	5
	9	8	6	6	7	6	7	5	8	5	10	11	8	4	4	1	4	4	5	1	6
	10	9	8	10	11	6	11	7	9	10	16	6	13	9	6	10	6	10	13	7	10
Female	11	7	10	9	8	6	8	6	9	6	13	6	3	9	6	10	7	6	8	8	5
	12	7	4	1	-3	8	0	-4	8	-1	8	-4	-9	-2	7	8	1	-2	4	3	3
	13	2	8	5	-4	-6	3	1	1	-2	1	3	4	-1	0	-2	-4	-2	0	-2	-3
	14	1	8	15	6	5	3	1	9	8	8	9	0	5	3	1	10	2	7	5	3
	15	6	11	15	8	16	1	2	10	19	8	3	11	12	8	6	4	6	-2	0	10
	16	3	9	5	8	9	4	2	5	7	7	8	2	8	6	9	9	4	5	9	4
	17	-2	-4	-3	-2	-1	3	3	4	-1	-1	-2	-3	-2	1	10	0	-5	5	-4	-2
	18	8	9	14	9	8	6	11	7	5	11	4	9	10	9	9	7	6	10	6	5
	19	0	6	7	8	3	3	3	3	5	-3	0	2	-2	1	3	6	4	7	-2	11
	20	-8	-10	-5	-5	-3	-8	5	-9	-7	-5	-6	-2	-4	-1	-5	1	3	-4	-7	-4

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects	Trial																		
	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male 1	10	4	16	10	4	5	8	13	11	10	11	9	12	14	8	18	5	5	10	2
2	11	8	7	10	8	10	10	11	7	7	11	10	8	8	7	9	8	6	8	10
3	6	3	9	4	2	2	6	6	2	-3	7	2	4	3	4	5	4	4	5	2
4	-4	1	0	-6	-5	0	1	0	6	-7	-2	-7	-3	-7	0	-2	-2	-3	-5	-5
5	11	8	19	8	15	11	13	11	12	19	17	0	16	8	3	6	16	8	17	2
6	6	3	3	7	0	1	0	-2	2	4	-2	-2	1	-3	0	4	-1	1	3	1
7	7	13	10	9	13	13	13	12	10	9	10	10	11	7	11	11	8	8	11	11
8	9	10	12	9	12	11	8	12	6	12	11	11	12	13	6	9	11	9	7	13
9	9	6	9	4	1	6	4	3	6	3	7	9	5	8	6	10	3	5	2	5
10	9	12	8	15	10	9	4	7	4	11	3	6	10	11	13	7	8	10	5	11
Female 11	7	4	13	12	2	7	6	9	9	6	8	6	4	5	8	9	5	10	4	3
12	-16	-8	-6	-2	7	-1	-5	5	4	0	5	-2	5	-1	-1	-2	-5	-12	6	-6
13	6	7	-7	-5	-6	-8	-2	-3	5	-3	-9	-3	-4	6	1	7	9	-1	0	3
14	3	12	15	1	11	-1	4	0	9	4	11	-1	7	11	0	2	11	12	4	-1
15	5	10	15	4	12	9	15	3	5	8	7	8	5	5	7	0	8	7	10	22
16	1	4	7	-1	5	4	9	3	6	2	6	4	5	5	7	7	3	8	7	3
17	2	0	3	-3	0	-2	7	1	8	0	3	-5	1	5	1	-4	-7	-6	-5	-5
18	3	2	6	5	4	3	4	9	6	6	?	4	9	11	10	5	8	8	9	9
19	2	5	2	4	1	4	1	0	1	2	2	6	-3	2	0	0	10	10	-5	8
20	-5	-6	-6	-5	-8	-2	0	1	0	-4	-2	-1	2	-1	-9	-2	0	-3	-6	-7

GROUP II - 2 CM. OBLIQUE LINES

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	20	14	10	16	11	4	7	3	7	10	3	14	14	7	1	-5	14	16	16	13
	2	21	18	15	13	10	7	7	16	20	11	16	10	4	19	14	8	10	11	15	16
	3	11	9	13	11	8	15	17	7	14	15	13	11	13	9	13	10	15	19	19	10
	4	12	16	12	16	9	15	11	8	16	15	16	9	6	5	5	15	8	6	6	15
	5	16	9	13	10	9	11	10	10	14	13	13	18	12	10	7	10	13	10	14	14
	6	16	16	18	15	14	14	12	14	17	10	14	12	12	11	9	11	8	13	13	14
	7	8	18	14	15	18	13	14	15	10	14	16	14	14	12	11	13	11	13	14	13
	8	18	16	7	3	7	6	3	5	2	4	4	4	4	5	4	3	6	7	8	5
	9	21	15	13	14	12	11	19	17	13	13	16	14	13	11	22	19	16	13	18	15
	10	13	15	15	15	11	12	7	13	13	9	13	6	7	5	5	8	7	1	5	5
Female	11	13	25	2	16	15	15	4	1	7	11	12	11	9	6	9	8	12	7	7	11
	12	9	8	8	11	12	15	13	9	15	14	13	10	11	17	13	13	17	13	10	12
	13	12	9	6	10	7	4	7	6	3	7	11	3	4	8	4	6	12	9	9	11
	14	8	17	12	7	8	12	11	1	3	9	6	14	5	3	11	3	-3	8	12	9
	15	22	17	17	19	21	21	21	22	16	19	14	17	14	15	16	20	14	9	11	10
	16	9	9	13	9	7	6	5	9	13	8	3	1	7	0	7	4	-3	4	7	1
	17	26	7	18	10	10	7	17	3	-2	6	7	11	6	14	15	11	14	12	17	11
	18	10	12	10	12	6	13	9	10	10	6	4	10	9	6	7	11	5	12	11	11
	19	12	12	11	14	11	17	15	11	10	12	9	8	10	10	6	15	10	11	10	6
	20	13	10	8	10	10	10	16	11	12	10	15	13	17	12	10	16	13	18	16	12

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	15	12	10	13	12	9	12	15	19	15	16	17	8	17	18	9	14	17	14	13
	2	17	15	8	12	16	9	10	15	12	13	14	14	14	12	14	11	7	10	6	7
	3	17	12	13	17	17	16	10	18	5	8	13	8	4	11	11	9	5	6	-12	0
	4	14	15	14	9	9	9	11	17	25	9	12	17	15	19	14	13	6	13	3	15
	5	10	12	12	12	16	14	11	10	13	14	10	12	14	8	14	15	12	19	12	18
	6	11	13	9	13	13	12	15	12	10	13	12	10	12	10	11	11	13	11	15	15
	7	11	17	17	12	14	13	12	13	12	13	15	10	10	13	16	12	12	0	-1	12
	8	5	7	9	9	7	9	9	10	12	9	11	10	13	10	10	10	10	7	8	10
	9	17	17	19	16	18	20	23	17	19	17	21	20	15	15	19	18	15	19	17	23
	10	5	6	7	8	10	-1	13	9	6	9	7	6	9	2	5	11	20	8	4	11
Female	11	12	6	5	11	3	8	7	5	7	9	8	11	7	6	9	10	7	15	10	9
	12	13	14	11	20	10	15	7	9	9	1	10	8	11	8	8	8	3	6	9	10
	13	6	11	9	3	5	10	2	5	9	10	7	7	12	6	11	10	8	7	6	11
	14	8	0	9	8	9	10	8	7	11	8	3	12	8	12	6	10	7	6	2	9
	15	13	14	17	13	15	19	17	16	17	19	15	20	21	23	22	19	20	20	17	25
	16	10	4	2	3	5	5	8	8	9	3	9	7	8	18	4	1	-7	2	13	4
	17	13	12	9	14	12	10	10	15	15	12	14	14	12	7	9	11	14	13	14	12
	18	7	7	6	9	6	5	12	11	10	10	11	11	15	5	8	10	11	2	13	8
	19	6	13	9	7	5	12	17	12	10	12	16	7	2	-4	18	16	16	11	9	11
	20	10	5	7	12	11	9	11	10	9	18	12	6	11	8	13	9	12	12	13	13

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	15	12	13	16	12	15	18	13	20	20	16	13	17	13	19	12	11	7	10	12
	2	9	7	11	10	16	10	12	12	11	11	8	9	10	7	11	12	8	11	9	8
	3	3	9	12	12	3	4	5	7	6	6	8	11	4	2	-1	0	13	3	-1	-10
	4	10	9	7	5	5	9	16	11	13	9	10	14	12	12	11	8	0	11	14	10
	5	11	16	16	11	17	12	10	14	14	18	16	9	20	4	10	18	15	12	11	12
	6	11	10	12	14	13	10	14	8	15	13	11	12	12	14	12	9	10	8	9	13
	7	13	11	7	7	10	4	7	4	6	10	8	8	5	13	4	9	11	8	7	6
	8	9	8	10	9	7	8	11	10	9	9	9	12	7	8	10	7	11	9	10	10
	9	12	11	15	13	14	15	15	12	14	15	16	15	13	19	18	20	15	11	16	18
	10	11	12	7	2	4	6	8	4	8	8	8	8	9	4	2	4	4	7	13	8
Female	11	9	8	12	18	8	5	8	7	10	9	7	4	5	5	5	8	7	5	8	4
	12	11	12	7	13	6	7	4	14	13	13	18	15	18	13	15	4	13	20	18	18
	13	8	12	16	8	13	11	13	12	9	7	6	9	8	15	8	11	7	11	10	10
	14	9	5	8	13	11	3	10	5	9	7	12	13	8	5	3	1	0	5	9	8
	15	22	17	21	13	13	11	12	13	13	16	10	14	18	18	12	14	9	14	10	9
	16	2	2	3	10	2	10	7	5	-4	6	13	9	11	2	6	5	1	3	6	-2
	17	13	15	16	10	14	11	11	10	10	10	10	11	10	10	14	16	13	12	11	9
	18	2	7	4	15	11	12	12	12	7	9	5	9	10	3	11	5	7	10	4	10
	19	12	12	2	9	12	5	18	16	10	10	8	2	8	5	7	10	17	7	7	9
	20	11	12	13	12	14	13	16	13	12	10	12	13	14	11	8	8	9	13	5	12

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	12	11	12	9	15	18	11	18	22	14	16	15	15	13	9	13	15	16	18	5
	2	14	9	8	16	9	13	7	9	12	9	8	10	11	9	8	10	7	8	10	8
	3	0	0	4	1	1	10	-2	9	7	9	3	-11	-9	-3	-3	2	-5	-3	9	3
	4	10	15	12	3	4	7	6	6	13	3	6	13	8	6	9	10	13	16	3	5
	5	6	10	8	8	11	7	15	13	13	18	15	18	14	14	16	14	12	6	11	12
	6	12	10	8	14	13	8	14	10	11	12	11	12	10	10	14	15	9	11	11	12
	7	1	1	-1	5	7	0	8	8	5	3	6	-1	1	-3	-5	-2	-6	2	6	5
	8	10	9	9	8	11	8	10	9	9	10	11	11	9	10	10	9	11	9	7	10
	9	14	16	14	17	16	16	14	16	16	18	19	12	13	19	16	17	14	13	19	14
	10	5	6	5	5	6	1	1	3	9	6	5	3	9	7	6	2	7	6	6	3
Female	11	5	7	10	7	6	8	6	17	10	10	6	4	8	7	6	6	1	4	7	7
	12	15	16	21	11	17	20	11	13	10	13	12	18	13	5	11	9	10	8	10	7
	13	16	7	6	8	9	16	12	15	10	9	13	10	11	11	11	8	11	12	13	12
	14	10	11	11	16	10	1	3	10	14	10	12	0	6	15	15	13	9	11	8	11
	15	11	13	9	15	13	7	5	11	16	12	16	16	9	10	4	7	7	7	6	10
	16	2	-1	13	-4	7	2	11	0	1	-2	2	-3	19	9	13	7	11	16	12	5
	17	6	13	7	8	11	10	16	13	18	13	14	14	13	12	12	11	18	3	10	11
	18	0	5	7	6	9	6	8	6	11	6	8	19	5	8	5	9	9	3	13	1
	19	5	12	7	10	19	9	0	6	6	8	12	16	0	5	6	7	5	9	8	17
	20	13	10	6	9	13	9	18	11	10	10	13	9	18	5	10	7	8	7	5	11

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	14	12	12	10	19	6	16	13	12	14	18	18	10	9	15	6	14	16	16	17
	2	5	9	6	4	11	4	6	11	9	9	7	8	10	5	5	10	8	7	4	8
	3	0	5	-9	-9	0	-9	3	1	4	3	7	7	6	4	4	-1	-4	3	-20	-1
	4	7	13	12	4	14	11	8	7	8	8	11	5	10	6	6	3	4	3	4	-1
	5	16	20	14	8	14	13	12	7	11	13	12	17	15	14	12	12	6	13	17	8
	6	13	11	13	13	14	11	11	16	15	10	11	13	12	14	14	13	12	12	13	12
	7	-1	-3	-2	-3	-2	4	4	0	1	-1	-1	3	1	2	4	-1	-1	1	2	4
	8	11	11	9	9	10	7	10	12	14	11	11	10	11	13	12	9	12	10	8	13
	9	13	10	15	10	15	15	11	15	17	18	11	13	14	17	17	14	13	13	15	16
	10	6	10	8	6	9	7	9	8	5	13	16	15	12	10	9	4	7	12	16	10
Female	11	15	8	8	8	7	6	4	7	5	8	2	8	7	7	7	6	4	7	7	5
	12	4	8	2	13	7	6	6	10	6	7	9	5	12	6	10	7	5	6	4	6
	13	14	9	10	12	14	10	10	10	14	8	10	7	12	10	6	15	8	5	4	13
	14	15	10	13	10	19	16	15	11	14	10	14	16	15	7	19	15	16	16	11	10
	15	9	7	10	12	3	9	10	5	13	5	-2	8	16	9	10	9	8	7	7	11
	16	4	6	7	9	10	13	8	10	9	5	10	5	6	6	2	5	11	12	8	8
	17	7	12	8	12	7	5	13	11	10	12	12	12	14	12	15	18	15	8	4	4
	18	2	2	11	8	5	12	13	0	2	9	9	-3	0	12	15	6	1	2	9	7
	19	12	8	10	17	14	5	10	6	13	12	13	11	15	10	9	6	2	5	8	7
	20	13	4	7	13	8	10	11	6	14	14	7	7	12	9	6	8	15	11	7	16

GROUP III - 3 CM. OBLIQUE LINES

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	12	13	10	12	12	9	10	11	10	7	9	11	11	11	13	11	11	10	10	13
	2	22	15	21	19	20	14	23	22	19	13	21	15	20	12	20	22	15	22	16	18
	3	22	30	27	9	11	6	17	10	5	15	11	13	7	10	10	16	10	16	13	11
	4	7	13	12	11	5	9	9	11	9	7	9	6	10	16	8	7	11	6	5	2
	5	21	18	16	19	15	12	12	19	14	6	13	10	9	10	15	13	12	16	12	9
	6	12	14	13	22	18	16	14	11	19	15	19	15	20	11	17	19	18	16	14	15
	7	1	2	3	7	8	6	8	7	9	-4	6	-3	4	6	6	4	3	3	5	1
	8	11	6	10	11	6	3	9	11	8	2	5	3	8	1	5	4	8	12	10	5
	9	20	23	17	13	19	23	20	14	13	17	13	13	25	22	22	16	24	20	13	15
	10	25	3	13	10	13	20	13	12	19	-6	12	10	14	11	15	9	17	8	14	8
Female	11	11	13	9	9	11	5	5	9	-1	13	7	16	8	14	9	13	11	10	14	11
	12	11	4	7	8	11	7	6	6	5	9	13	9	13	15	12	14	12	8	15	12
	13	16	19	16	15	16	16	14	17	15	19	15	17	12	13	14	15	15	17	16	20
	14	17	16	10	13	15	16	13	12	7	11	8	7	7	8	6	4	9	10	9	9
	15	8	21	20	10	10	12	13	11	19	15	15	15	16	10	12	16	23	17	20	11
	16	8	12	9	4	7	11	6	6	-2	2	2	2	2	6	3	6	1	8	8	2
	17	12	12	13	14	11	17	16	15	12	10	16	15	19	12	9	11	10	14	12	14
	18	8	12	10	12	13	9	13	13	12	7	9	16	4	12	5	12	9	10	13	12
	19	26	13	18	20	14	16	15	16	16	13	16	9	14	12	19	18	13	16	12	11
	20	12	11	10	7	11	9	17	10	17	8	6	7	10	15	11	11	4	2	1	9

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	14	10	11	8	13	11	11	11	9	10	13	12	9	14	9	12	8	14	8	7
	2	19	20	17	18	16	14	12	14	12	12	13	13	12	11	10	11	16	12	11	13
	3	7	6	10	12	17	16	11	4	17	19	9	7	12	11	7	9	6	18	17	16
	4	13	9	8	5	14	14	15	18	4	11	3	11	14	-1	15	10	9	8	6	7
	5	9	14	15	14	14	13	16	16	15	15	10	12	15	12	10	7	7	11	12	13
	6	16	11	15	13	12	13	14	10	12	10	8	9	9	11	9	9	6	10	10	16
	7	6	9	-1	2	3	7	4	4	1	4	-1	2	8	7	3	6	6	7	7	3
	8	1	1	11	7	6	6	-3	0	3	3	2	5	8	9	6	11	12	-3	5	4
	9	20	17	13	11	13	19	19	17	20	15	20	27	18	18	10	14	15	14	14	13
	10	10	17	11	16	12	16	8	9	11	11	15	12	13	11	15	8	19	15	15	14
Female	11	13	6	12	6	-1	5	12	9	13	9	10	5	14	11	3	8	17	5	12	8
	12	13	12	16	12	11	11	10	11	5	11	9	10	4	10	11	11	4	9	7	8
	13	21	15	15	15	15	11	11	17	17	14	15	14	11	19	12	16	16	14	11	13
	14	7	9	7	11	13	7	6	6	6	12	14	16	10	15	15	16	13	10	9	10
	15	13	12	12	12	22	21	16	13	14	14	14	19	4	18	14	5	10	16	7	12
	16	7	3	7	6	3	2	-1	6	2	2	4	2	9	6	7	3	10	8	16	9
	17	9	13	11	11	9	11	11	11	10	9	11	9	7	6	10	12	11	6	12	7
	18	12	7	8	10	11	14	10	12	9	9	19	10	7	8	14	10	11	10	3	8
	19	17	14	13	13	16	20	9	16	14	15	16	17	14	11	7	17	16	20	15	18
	20	14	3	15	7	13	12	12	6	15	9	10	2	14	16	4	11	8	1	8	11

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	7	6	7	5	4	3	4	7	5	3	7	4	7	9	2	1	6	5	1	0
	2	14	11	11	11	14	11	12	15	11	12	10	10	14	11	11	9	12	10	9	12
	3	14	14	13	8	11	6	14	11	12	13	15	11	7	10	14	10	9	13	15	14
	4	7	-1	4	12	7	11	8	6	7	7	10	7	7	3	13	15	16	17	11	8
	5	9	12	16	16	10	10	17	16	16	20	16	11	15	17	18	18	15	7	14	10
	6	9	6	5	11	8	9	11	8	8	9	6	4	4	2	2	-1	4	2	5	3
	7	7	0	10	1	7	6	1	1	8	2	4	4	5	2	10	8	5	-2	10	0
	8	7	-4	-5	7	3	0	1	7	2	2	4	5	6	-3	6	5	16	-2	2	2
	9	17	7	17	16	16	9	8	18	16	14	10	10	10	15	15	18	19	15	16	18
	10	11	9	14	10	13	12	5	7	5	5	10	12	10	11	8	11	7	15	12	11
Female	11	22	16	3	10	5	9	9	14	9	3	8	8	6	9	5	4	9	11	9	8
	12	11	10	12	10	8	7	9	5	5	9	12	8	7	5	5	5	5	8	8	7
	13	13	15	16	12	12	11	11	13	14	8	10	11	9	12	9	10	11	12	12	15
	14	8	4	13	7	12	8	19	18	7	8	12	8	5	15	6	9	8	12	4	8
	15	14	12	17	17	13	12	8	10	13	9	7	9	14	14	10	7	12	12	11	16
	16	11	12	5	10	7	3	6	10	3	10	8	10	9	5	6	5	8	7	3	1
	17	15	10	13	12	10	11	7	8	12	13	10	11	11	11	10	12	11	13	12	10
	18	14	8	8	8	9	10	9	11	5	15	12	5	11	1	5	12	9	6	8	6
	19	15	23	21	19	11	13	16	13	18	15	12	16	12	16	15	14	15	18	19	16
	20	9	13	18	8	13	13	7	10	2	9	11	17	9	4	1	6	-3	19	12	4

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	2	5	7	3	3	5	3	4	6	4	7	4	2	8	2	5	4	6	5	9
	2	10	13	13	9	12	10	9	11	8	8	12	13	10	9	8	15	11	14	11	9
	3	13	12	10	10	12	10	7	5	14	16	10	12	14	16	9	12	17	16	10	14
	4	9	14	7	8	4	5	8	6	19	14	12	5	13	12	5	10	9	10	10	4
	5	12	10	13	12	13	21	7	11	11	10	11	11	16	8	8	12	16	18	19	3
	6	1	5	1	1	4	9	7	7	10	6	0	11	2	1	3	8	11	7	1	6
	7	0	8	3	2	5	1	4	8	7	4	-2	-2	3	2	3	0	-1	5	-4	8
	8	7	5	1	-1	10	-6	-1	9	-1	6	4	8	8	4	10	7	4	8	6	7
	9	24	17	9	11	15	9	15	13	10	19	13	7	17	19	11	9	11	12	11	18
	10	10	9	6	7	6	14	12	11	7	11	9	10	16	10	7	13	11	6	9	13
Female	11	9	11	10	2	-3	-5	-2	-3	3	6	4	-1	-2	2	3	3	7	10	4	8
	12	5	7	8	8	9	3	4	10	10	4	7	8	6	11	10	9	6	11	5	1
	13	12	11	10	23	20	16	12	14	12	9	11	12	10	12	12	10	14	11	16	10
	14	1	8	9	13	7	13	5	8	14	11	5	10	10	4	8	8	12	6	6	7
	15	10	13	12	14	5	14	15	10	14	16	12	9	13	13	14	11	11	9	9	14
	16	6	4	3	6	6	5	4	10	5	2	3	4	8	3	5	0	2	6	-2	-3
	17	10	12	10	18	15	4	17	18	17	9	15	18	14	13	14	12	14	14	16	17
	18	10	4	9	9	9	8	1	8	9	11	9	5	8	6	5	9	5	7	11	10
	19	15	14	17	16	17	13	18	17	17	15	17	16	15	16	15	15	16	15	17	11
	20	9	-2	5	-8	1	8	9	13	11	1	-2	-1	9	13	8	7	10	14	12	20

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	6	7	7	6	7	8	8	8	9	7	2	11	6	4	5	8	5	5	2	9
	2	11	11	15	13	9	12	6	8	11	16	12	11	14	9	7	8	14	7	11	11
	3	15	8	8	11	9	7	17	7	14	11	10	15	16	16	11	10	11	8	9	8
	4	4	13	7	15	10	5	15	5	13	4	4	8	7	21	7	19	5	16	11	13
	5	5	7	8	10	11	4	12	9	11	12	9	7	8	9	9	8	11	6	8	5
	6	-1	5	0	5	7	2	1	4	2	8	3	2	-1	-3	3	1	-1	7	8	5
	7	-2	1	4	1	-1	1	-1	3	1	1	-6	2	-3	-3	1	-2	-1	-1	1	-7
	8	-10	3	5	3	3	5	-2	0	4	5	5	4	15	7	5	8	9	-3	4	-1
	9	19	15	17	18	8	12	10	15	17	10	13	17	15	9	3	16	10	14	19	14
	10	9	12	11	15	9	10	12	8	9	11	7	14	15	19	13	10	7	11	10	7
Female	11	4	3	5	8	5	2	1	10	2	-5	13	10	3	4	12	6	5	-1	5	5
	12	-1	10	9	6	6	11	5	3	4	8	5	7	9	9	6	6	10	9	7	6
	13	11	9	10	14	10	9	9	11	9	9	10	8	13	9	6	8	10	10	9	10
	14	11	6	11	7	11	9	11	13	17	6	7	10	11	4	5	2	3	-1	10	8
	15	16	12	7	9	10	11	9	12	16	12	11	8	13	8	14	12	12	14	13	8
	16	4	-3	-3	3	1	-3	-2	6	0	6	9	6	2	3	4	0	5	5	10	-1
	17	18	9	11	20	5	7	9	1	7	2	3	2	5	6	2	5	3	6	4	10
	18	9	9	6	5	9	5	12	8	7	12	3	11	13	2	8	3	8	4	9	5
	19	15	14	18	18	16	14	15	16	17	24	17	18	14	14	18	17	23	20	16	12
	20	6	16	7	20	8	5	10	5	14	8	10	10	12	10	16	11	8	11	9	4

GROUP IV - 4 CM. OBLIQUE LINES

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	12	10	9	13	11	7	8	14	12	11	13	10	10	13	7	11	10	12	14	11
	2	12	10	7	2	3	8	9	8	5	6	7	9	6	11	11	5	12	11	7	8
	3	22	30	26	24	22	26	31	27	32	30	31	31	27	28	32	34	32	27	26	23
	4	18	13	8	16	11	9	7	13	11	8	11	8	11	11	9	13	7	8	11	7
	5	18	17	11	12	12	11	8	10	7	8	10	7	8	12	10	11	10	10	7	10
	6	18	17	16	11	13	16	15	15	11	10	14	15	11	14	13	13	17	16	15	16
	7	20	14	15	10	16	15	11	14	9	10	9	12	8	10	15	12	15	7	11	10
	8	20	5	7	0	17	2	15	-2	0	6	6	1	1	3	6	5	3	2	2	3
	9	24	13	14	7	22	9	17	20	25	17	12	20	17	18	11	12	14	14	7	13
	10	14	18	18	14	13	18	15	14	16	16	10	12	17	9	18	17	15	16	11	16
Female	11	8	5	11	4	11	10	6	3	9	6	6	5	11	2	8	-1	4	15	3	5
	12	16	12	13	11	14	9	10	13	11	11	11	8	8	11	11	9	9	9	8	13
	13	22	23	9	16	13	9	6	6	8	8	7	5	6	4	8	0	10	0	-1	7
	14	18	10	13	9	18	13	15	10	18	19	13	18	17	21	12	23	15	13	25	15
	15	7	14	8	11	9	16	12	4	17	7	13	8	8	10	8	11	11	10	21	16
	16	15	14	19	17	13	17	16	17	17	13	10	10	14	14	13	10	11	13	10	11
	17	8	10	14	13	14	18	20	13	14	10	12	7	10	12	10	14	8	11	12	12
	18	19	17	14	21	21	4	13	5	5	21	10	16	11	19	10	8	11	10	9	9
	19	9	12	31	30	36	17	20	19	15	20	21	19	25	18	23	25	21	24	19	27
	20	16	16	20	16	11	22	12	23	27	23	16	17	21	17	19	17	14	20	22	18

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	10	8	7	14	14	11	12	12	9	10	4	3	7	6	4	4	11	10	7	6
	2	4	4	13	11	13	13	14	9	5	10	5	4	11	10	19	7	12	5	2	4
	3	18	21	23	19	20	24	20	25	23	26	22	22	18	20	30	26	24	19	26	27
	4	7	10	6	7	9	5	6	8	7	9	6	8	7	8	5	5	4	5	9	10
	5	12	11	11	12	11	13	9	7	8	11	8	9	11	12	10	11	9	8	6	5
	6	14	16	17	15	18	18	16	13	15	18	18	19	14	16	13	17	14	16	16	13
	7	14	7	13	11	15	15	14	13	12	7	13	16	11	13	10	8	14	11	12	11
	8	4	6	13	6	6	12	11	9	10	6	13	12	12	6	4	9	8	8	9	9
	9	18	17	18	13	10	15	20	17	21	11	19	14	16	15	18	14	14	17	12	15
	10	9	13	12	10	15	14	15	11	9	13	16	11	11	14	9	13	9	8	10	8
Female	11	5	12	7	18	11	11	13	10	15	16	10	13	7	10	17	5	10	15	13	8
	12	7	9	11	15	16	12	14	9	10	13	13	9	9	11	8	11	11	15	17	11
	13	7	7	2	9	8	6	5	3	10	5	3	7	11	12	8	3	7	7	11	10
	14	20	17	15	18	16	18	16	15	16	12	13	23	11	11	16	6	21	22	9	20
	15	10	13	14	12	14	12	15	14	15	12	15	8	8	13	16	11	9	7	14	11
	16	11	12	11	9	9	14	8	8	9	6	6	7	9	2	3	2	3	4	5	1
	17	10	13	9	13	11	11	8	14	11	10	15	13	10	13	10	12	10	14	8	10
	18	8	4	11	10	10	7	7	9	7	7	9	8	9	10	9	7	9	10	6	7
	19	21	28	27	28	27	28	18	16	20	23	24	20	22	25	21	25	28	29	23	22
	20	14	15	15	18	14	10	18	16	15	15	12	20	14	12	13	20	14	15	10	7

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	2	6	7	9	13	18	14	10	7	13	13	7	14	11	7	11	13	15	10	6
	2	6	18	11	18	14	4	-1	14	4	16	11	7	2	2	4	14	14	13	10	14
	3	24	22	28	33	26	23	22	19	14	22	31	25	18	26	22	26	27	22	27	14
	4	3	-1	4	0	5	8	1	0	1	1	-2	5	-1	2	3	4	3	5	-2	6
	5	5	6	8	7	9	10	10	7	9	8	6	8	8	10	7	10	7	9	5	5
	6	17	15	21	15	20	15	16	15	10	16	16	15	15	17	16	16	18	15	18	16
	7	11	11	17	14	13	10	8	10	8	13	12	11	8	13	8	13	8	11	10	11
	8	5	6	7	10	5	8	5	7	6	6	4	1	5	7	3	5	3	6	2	4
	9	18	14	18	13	13	14	19	13	12	12	18	9	12	12	10	11	12	8	9	14
	10	9	9	8	11	10	12	11	12	8	11	12	10	8	8	9	6	5	3	1	4
Female	11	8	11	14	14	11	12	12	14	10	11	11	17	13	5	3	1	1	-7	3	-2
	12	11	10	11	15	14	12	9	11	12	12	10	8	14	6	8	12	7	9	8	3
	13	12	10	7	6	10	9	11	15	13	10	6	3	9	4	6	6	4	4	2	6
	14	12	11	23	15	17	9	13	14	18	15	16	8	19	16	16	16	20	15	11	11
	15	5	5	11	-1	3	8	8	6	6	4	4	6	6	11	8	8	9	2	9	6
	16	3	3	2	3	5	4	0	-5	3	-5	-3	-3	2	3	-3	-5	3	3	-1	3
	17	13	9	6	10	12	12	7	7	6	10	10	14	6	8	6	14	7	10	8	11
	18	8	12	10	8	10	8	8	5	10	11	7	9	10	8	7	11	10	4	14	10
	19	28	23	26	25	29	20	22	21	23	23	25	32	22	26	25	21	25	22	27	30
	20	11	16	12	11	18	6	14	9	16	10	11	17	10	20	18	16	6	16	15	8

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	7	9	15	6	13	13	2	10	14	16	13	5	2	11	12	2	6	9	5	8
	2	18	5	6	12	15	14	14	6	8	3	0	9	3	1	11	-1	11	5	13	14
	3	21	27	26	24	31	31	39	19	20	22	26	32	32	23	22	26	24	24	25	21
	4	0	-2	3	7	5	4	5	4	3	2	6	3	8	1	2	5	1	5	0	1
	5	0	10	4	0	5	4	7	5	7	3	5	2	5	2	3	5	9	6	3	5
	6	16	17	18	17	23	12	17	14	18	14	14	15	14	12	16	14	19	14	17	13
	7	14	11	10	13	9	10	11	10	14	14	10	14	11	9	12	16	18	16	11	14
	8	5	3	3	8	6	8	7	4	6	8	7	4	5	5	5	6	3	6	6	6
	9	12	15	11	14	13	11	13	12	13	13	16	24	14	14	12	18	10	12	7	10
	10	6	6	7	3	5	8	5	4	5	7	8	6	8	9	9	6	6	5	4	5
Female	11	-1	-3	0	-8	-2	0	-7	-12	-3	5	4	0	3	1	3	2	0	4	0	5
	12	10	9	12	12	13	7	6	10	10	10	9	12	8	8	9	11	6	9	3	10
	13	9	5	-1	10	6	-2	10	8	11	12	6	3	8	6	10	17	13	11	17	11
	14	14	10	16	17	12	13	15	15	11	15	13	16	15	9	14	6	16	20	16	11
	15	6	5	13	8	12	12	13	12	9	14	8	5	9	10	12	8	8	8	4	5
	16	-3	-2	-6	-7	-5	-5	-6	-7	-5	-8	-5	-6	-8	-3	-6	-4	-6	-5	-6	-3
	17	7	10	11	5	14	10	8	10	9	8	8	6	10	7	10	9	6	6	5	6
	18	7	8	5	11	9	8	8	6	10	8	8	14	12	11	11	7	5	9	6	9
	19	24	25	29	29	28	21	20	21	22	22	30	40	25	26	29	34	40	27	25	26
	20	4	16	1	16	5	16	5	13	16	13	8	10	10	12	12	1	13	10	14	16

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	6	7	4	2	9	8	6	-1	1	6	0	-3	8	6	-1	0	5	-1	-1	4
	2	16	4	10	15	1	13	1	11	2	13	3	9	2	-3	5	17	7	8	13	6
	3	28	28	24	30	30	19	18	26	35	27	23	22	26	26	26	26	24	26	26	23
	4	0	2	0	2	-3	0	0	2	3	6	-1	5	5	4	10	0	9	0	3	1
	5	4	6	7	4	5	6	3	6	4	6	6	11	4	2	5	4	4	3	6	3
	6	17	15	12	17	20	17	15	18	13	16	17	17	15	17	14	15	18	12	19	16
	7	13	14	12	14	20	15	15	20	20	12	8	12	9	9	16	24	14	9	13	10
	8	3	2	4	9	8	9	4	4	6	5	6	5	5	5	6	5	7	6	3	6
	9	9	11	12	10	17	12	13	13	12	12	13	8	11	10	14	13	12	10	11	11
	10	5	6	3	6	4	7	5	5	6	4	6	2	7	3	2	5	4	1	1	4
Female	11	10	13	0	2	9	9	0	15	8	2	7	7	14	8	14	13	7	3	10	9
	12	10	9	0	8	8	9	8	10	8	7	10	8	7	8	9	7	9	8	8	8
	13	12	8	6	10	29	11	10	10	7	14	13	7	18	10	6	5	7	6	7	18
	14	11	19	12	18	15	14	10	5	17	6	9	2	5	-1	-1	3	-1	7	1	7
	15	9	10	7	8	9	7	9	7	9	9	14	8	3	14	5	10	9	7	9	5
	16	-3	-1	-4	-1	-5	-5	-7	-9	-7	-7	-3	-7	-7	-8	-9	-6	-9	-6	-11	-9
	17	8	10	9	5	9	5	6	5	7	10	10	5	8	4	9	3	8	7	7	4
	18	7	13	6	2	13	8	2	4	9	10	6	6	4	10	4	12	9	13	10	12
	19	26	22	22	25	23	29	26	23	30	26	30	23	25	26	29	24	23	31	25	28
	20	5	8	12	1	6	13	15	9	9	13	10	4	0	16	7	15	12	13	12	15

APPENDIX C

RAW DATA FOR EXPERIMENT 3

GROUP I - 30 DEGREE ANGLE

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	21	19	19	16	18	15	18	12	20	12	19	12	17	15	20	16	17	14	19	15
	2	10	15	15	12	11	9	10	11	8	11	10	10	7	6	8	11	7	7	10	5
	3	29	25	35	30	21	33	22	28	23	15	15	21	19	18	13	13	7	12	13	20
	4	32	16	17	20	17	15	17	18	23	13	14	20	14	13	12	12	16	20	17	15
	5	20	18	18	15	15	15	16	16	14	16	14	17	10	13	15	19	13	15	19	11
	6	6	10	10	9	2	6	5	6	11	12	10	13	10	10	12	14	10	9	5	7
	7	10	8	3	4	7	5	2	2	3	6	10	5	6	12	10	6	14	8	15	8
	8	9	8	8	6	7	5	6	6	5	6	8	6	4	6	7	5	4	3	2	7
	9	9	14	7	9	12	13	7	11	13	12	11	8	7	11	10	14	9	9	12	9
	10	13	11	10	15	9	8	13	6	3	11	8	10	6	8	13	8	10	3	3	6
Female	11	18	17	18	20	13	11	10	17	13	9	14	11	11	13	16	16	16	12	10	13
	12	13	18	13	13	19	18	11	14	11	13	10	11	13	11	10	9	14	15	14	11
	13	14	10	6	12	7	16	10	13	10	11	11	5	7	8	9	3	7	8	13	18
	14	20	12	15	16	18	14	16	19	17	17	16	22	18	16	13	17	15	13	10	18
	15	20	16	20	17	19	17	19	14	16	16	16	14	12	13	11	13	11	14	12	11
	16	15	16	15	16	14	18	14	18	19	13	12	16	19	15	16	12	17	16	11	18
	17	19	14	8	14	12	8	8	13	8	9	11	10	14	13	12	10	11	11	14	14
	18	10	11	18	4	3	6	11	7	4	8	7	6	5	6	10	7	5	3	7	8
	19	19	19	14	18	16	14	19	13	15	19	11	18	13	18	16	12	17	16	14	16
	20	19	20	22	19	18	27	15	13	23	13	12	11	15	17	17	16	14	15	6	10

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	16	14	10	15	14	14	12	11	15	14	10	14	17	13	9	9	11	14	13	8
	2	7	4	7	7	6	9	5	5	5	6	6	3	5	1	6	4	8	3	2	2
	3	22	22	11	21	22	15	28	23	35	19	25	22	25	17	15	18	26	18	17	13
	4	16	22	13	8	12	14	13	16	16	9	13	10	8	11	16	12	16	16	15	18
	5	5	3	9	9	10	9	13	13	9	19	11	14	13	12	11	7	12	9	9	8
	6	6	11	4	3	3	2	4	4	5	5	6	6	7	5	6	7	4	3	7	4
	7	11	10	10	12	10	11	12	15	14	11	15	14	14	14	15	12	13	15	11	15
	8	7	5	11	9	6	10	11	12	6	7	6	9	12	5	2	6	6	5	10	14
	9	10	9	9	11	15	9	10	14	12	12	15	14	7	8	7	8	14	8	7	7
	10	8	12	9	10	13	6	6	8	11	7	9	10	6	8	8	7	5	7	6	4
Female	11	8	10	10	10	8	10	16	10	10	14	8	12	12	12	7	10	15	4	15	11
	12	15	11	15	9	13	13	7	13	12	11	12	16	8	5	9	11	5	10	4	4
	13	15	11	12	15	15	13	5	9	14	12	7	11	13	9	5	7	7	9	4	7
	14	12	17	9	13	19	15	13	19	12	17	16	10	18	19	12	14	14	11	18	21
	15	13	13	12	14	12	10	14	9	8	14	13	9	12	7	11	12	13	15	15	13
	16	12	13	14	17	20	19	20	21	15	19	13	16	16	14	18	13	16	17	17	16
	17	8	13	13	16	11	10	14	15	9	7	10	19	9	6	8	18	16	6	10	11
	18	6	4	4	6	3	4	4	4	7	6	5	7	6	4	8	5	6	5	5	14
	19	9	17	13	15	15	15	18	15	18	19	19	14	21	12	20	14	12	13	13	17
	20	7	6	8	8	7	9	8	12	5	5	10	11	5	8	9	13	6	9	12	12

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	10	6	9	10	8	9	10	7	6	9	9	7	9	7	8	10	5	8	8	7
	2	0	4	7	7	3	2	3	5	3	2	1	3	3	2	1	4	2	2	5	-1
	3	6	17	16	14	22	24	28	13	11	16	20	18	20	18	21	21	18	18	17	15
	4	15	11	11	14	15	14	16	12	11	14	9	11	15	15	14	11	11	9	8	9
	5	5	5	5	1	3	2	9	6	10	6	10	12	11	2	1	5	4	10	9	2
	6	3	0	4	4	5	2	3	4	5	5	2	1	4	0	4	2	3	4	1	5
	7	11	12	13	11	12	13	10	10	10	16	12	11	12	10	13	5	15	7	7	11
	8	5	6	5	6	7	13	11	7	8	6	8	11	10	13	8	7	8	7	5	7
	9	6	11	13	12	10	15	8	12	9	11	12	14	9	4	11	8	11	8	11	9
	10	6	5	9	8	10	5	11	11	2	2	2	3	3	6	8	5	2	0	9	11
Female	11	16	10	9	13	12	12	11	12	10	10	13	9	6	11	8	13	8	12	11	7
	12	3	2	4	2	5	2	2	1	1	-1	3	3	1	2	7	1	3	4	6	5
	13	10	10	10	11	10	9	16	16	11	11	4	6	17	8	12	11	14	14	16	13
	14	11	19	16	14	26	17	14	16	13	11	14	13	13	18	14	21	13	8	10	10
	15	12	14	10	9	15	8	15	15	14	18	16	16	18	16	14	10	14	10	13	11
	16	17	17	16	15	12	9	13	14	16	17	17	12	11	13	17	15	15	10	12	12
	17	5	21	17	9	6	11	13	9	12	13	2	14	7	11	8	15	12	14	6	5
	18	3	0	3	6	3	3	6	9	6	6	0	11	6	7	10	8	9	4	4	6
	19	12	15	16	16	13	15	15	13	11	15	14	20	7	11	9	11	11	13	8	11
	20	12	12	16	12	13	15	15	11	13	10	11	8	15	7	10	14	8	6	5	10

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	7	7	8	6	7	6	3	3	4	8	2	3	9	4	9	6	5	7	3	6
	2	3	2	2	2	3	4	2	1	4	-1	3	2	1	-1	3	0	1	3	0	0
	3	22	17	14	14	16	11	10	8	13	13	14	5	14	15	13	8	14	7	7	20
	4	5	4	6	3	11	5	11	3	12	10	7	11	6	4	6	9	3	9	9	8
	5	10	2	-5	7	5	6	6	3	2	1	1	0	3	1	4	13	7	7	4	9
	6	7	4	0	0	1	1	-1	1	4	4	0	5	4	4	2	5	3	1	0	5
	7	11	10	8	15	10	12	11	14	17	16	15	11	14	12	10	12	13	11	12	8
	8	6	10	5	0	7	6	6	7	9	9	11	9	9	7	9	8	9	7	8	7
	9	8	10	12	9	10	11	13	13	12	14	10	10	10	10	11	11	7	6	10	10
	10	6	11	11	10	4	7	6	5	4	9	13	5	8	5	0	10	2	6	10	10
Female	11	14	11	10	13	14	11	12	11	16	11	11	11	7	11	13	7	7	10	10	6
	12	2	9	5	3	2	5	1	8	4	2	6	3	2	6	4	7	4	6	2	4
	13	9	10	10	12	12	7	12	8	8	8	7	7	14	8	5	8	9	9	3	12
	14	10	10	10	18	11	12	6	9	10	12	12	7	11	11	9	11	7	13	6	7
	15	15	17	12	10	10	10	12	16	14	14	13	11	12	15	14	10	8	13	11	9
	16	12	13	13	15	20	14	14	10	12	12	9	15	6	9	16	11	17	13	12	11
	17	19	11	9	11	14	7	5	7	9	14	19	7	8	10	0	2	2	13	8	5
	18	5	4	3	9	6	3	2	3	0	3	5	7	6	11	10	10	6	3	3	0
	19	11	14	16	13	11	8	11	12	9	12	14	13	7	14	14	15	10	8	10	10
	20	9	13	8	8	8	7	11	4	9	10	6	8	9	13	9	9	7	12	7	14

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	7	6	6	10	5	6	7	6	4	7	5	1	2	6	5	3	8	1	3	4
	2	2	0	3	0	1	-1	0	-1	1	-2	3	0	-1	2	-3	-1	-1	-2	-1	-1
	3	12	16	6	21	11	18	15	8	12	12	13	21	14	16	14	6	10	5	10	15
	4	1	6	7	9	11	7	11	1	10	7	13	10	10	8	3	4	5	12	13	7
	5	3	3	6	9	4	9	11	6	7	3	3	2	8	0	5	1	0	0	4	0
	6	1	-1	1	1	-1	2	-3	-3	0	0	-1	1	2	2	1	0	2	3	4	1
	7	14	10	10	12	12	9	9	11	9	14	6	7	9	9	12	7	10	9	10	6
	8	10	5	3	8	11	19	8	3	5	7	9	13	4	7	1	6	5	7	4	5
	9	6	12	13	5	6	11	16	10	10	13	8	14	12	11	9	7	11	11	12	6
	10	11	0	3	8	7	7	10	6	4	5	5	4	8	9	3	7	2	7	13	9
Female	11	7	8	14	8	10	10	7	12	9	11	10	6	13	12	11	12	8	11	14	12
	12	1	4	5	7	6	5	7	8	7	6	5	5	1	4	7	3	4	4	3	9
	13	11	15	9	10	7	8	2	9	5	9	13	10	14	9	9	15	10	10	10	13
	14	9	6	15	8	8	13	11	10	9	11	7	13	15	9	6	11	10	8	12	13
	15	15	11	14	12	3	10	8	10	4	14	4	10	11	11	15	8	9	6	11	10
	16	10	21	15	14	10	11	12	15	11	14	12	13	13	15	10	14	14	19	11	15
	17	11	7	9	4	14	10	8	9	13	8	15	12	11	5	3	13	7	7	6	4
	18	9	6	5	3	3	5	3	3	3	3	5	6	0	3	10	2	5	0	0	2
	19	20	11	13	10	12	10	15	13	10	16	13	27	11	11	14	15	9	10	9	12
	20	7	10	7	14	7	9	7	14	10	13	16	16	6	13	11	12	10	14	7	13

GROUP II - 60 DEGREE ANGLE

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	16	15	9	16	16	20	16	14	15	20	16	16	15	19	17	23	17	15	17	21
	2	22	19	19	18	14	13	13	15	14	16	18	13	14	15	16	16	19	15	17	15
	3	7	12	10	5	12	8	10	14	11	13	11	9	12	8	14	8	13	11	14	12
	4	22	13	17	18	15	19	17	12	12	16	14	17	13	11	19	12	16	14	10	17
	5	15	13	11	8	11	10	9	11	10	8	11	12	8	5	10	10	6	12	11	12
	6	11	15	11	11	9	8	7	8	13	14	12	12	11	8	12	5	16	8	14	16
	7	18	12	7	7	4	0	6	6	4	6	5	7	5	6	10	11	7	6	3	8
	8	8	10	12	7	11	11	9	9	10	8	13	9	5	8	7	12	8	7	6	4
	9	14	13	13	7	6	7	10	11	11	7	10	11	6	11	11	6	14	10	3	7
	10	17	11	17	17	12	17	14	11	18	14	14	14	19	17	17	14	12	15	14	15
Female	11	15	15	14	11	11	12	12	17	13	15	14	25	18	14	13	12	13	13	17	14
	12	17	20	19	22	26	19	13	20	15	19	25	22	18	23	16	26	20	16	20	18
	13	20	16	12	13	10	12	15	17	9	3	4	16	15	16	15	6	4	13	14	13
	14	12	12	9	13	12	9	10	3	10	11	13	12	2	11	6	12	9	11	7	6
	15	15	16	12	20	14	16	12	15	14	11	17	12	14	17	12	20	10	16	15	10
	16	16	18	14	17	15	13	14	11	11	11	15	8	17	16	18	7	9	6	12	12
	17	12	11	12	6	13	9	5	11	7	7	6	0	4	6	6	2	7	2	3	4
	18	17	20	17	19	17	21	18	20	25	18	15	12	18	15	14	20	20	12	7	11
	19	3	14	7	11	9	15	14	16	12	10	11	19	9	20	11	16	10	14	10	20
	20	24	26	18	18	23	19	19	17	12	18	18	14	18	19	24	19	20	21	18	18

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	16	14	20	10	17	17	11	17	17	13	16	13	19	17	12	14	12	19	14	19
	2	19	17	20	21	18	18	23	20	18	22	20	20	23	21	19	20	19	19	20	19
	3	12	10	9	10	11	12	11	10	13	9	11	13	9	9	9	4	6	4	6	9
	4	11	12	7	10	8	6	10	9	8	11	7	11	13	11	13	11	12	11	13	9
	5	9	7	12	10	10	11	8	7	4	6	8	9	7	4	3	10	9	7	6	5
	6	9	10	11	15	12	4	10	6	10	4	9	5	8	3	5	7	7	5	9	7
	7	3	4	-1	7	5	6	8	8	7	5	4	-2	2	9	6	2	13	7	4	4
	8	5	5	5	3	0	3	6	1	2	3	8	5	7	10	9	5	6	10	9	7
	9	4	13	10	7	11	7	8	6	8	7	6	12	4	9	7	10	6	4	10	7
	10	18	16	13	13	19	16	12	16	16	10	10	12	16	19	13	16	13	9	9	10
Female	11	13	18	16	7	15	15	13	18	16	13	13	14	13	11	15	16	13	15	17	14
	12	15	18	23	21	25	22	19	24	24	18	18	17	17	19	20	19	15	9	13	17
	13	18	9	10	9	9	6	6	4	4	-1	16	9	11	2	3	10	9	10	3	10
	14	11	15	5	11	10	14	7	11	10	12	11	13	16	8	11	5	10	10	10	13
	15	13	18	12	14	12	15	10	12	13	8	19	16	15	14	19	9	9	11	15	18
	16	6	10	8	10	6	7	2	1	6	2	6	6	5	5	2	6	2	5	6	2
	17	9	-1	5	3	10	2	-5	0	4	5	7	8	3	8	3	9	5	5	1	8
	18	10	12	11	11	25	14	15	12	17	18	10	14	21	18	16	19	16	19	22	18
	19	20	17	11	12	12	14	16	20	6	5	3	6	6	4	8	1	6	14	8	9
	20	16	20	16	15	15	16	16	20	19	18	20	22	19	13	18	25	23	20	22	18

GROUP II (CONTINUED)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	17	11	14	12	17	17	18	15	17	17	13	20	16	15	11	19	19	15	18	16
	2	15	17	18	20	18	19	18	14	16	17	18	15	20	17	16	15	20	18	18	18
	3	4	6	7	6	7	10	7	6	5	4	1	3	5	7	6	6	5	6	4	6
	4	9	10	15	12	12	12	14	9	14	0	5	6	5	7	11	11	13	8	6	6
	5	9	10	7	7	10	10	4	7	10	9	8	10	8	6	8	9	6	10	7	9
	6	9	7	7	5	6	5	8	3	1	3	6	6	7	10	3	5	11	11	4	5
	7	7	0	2	7	4	2	0	-4	0	-3	3	5	-3	1	1	1	-1	5	-8	1
	8	6	7	8	6	8	5	4	4	3	3	5	4	4	2	6	3	7	2	6	1
	9	9	12	5	9	10	8	5	10	7	11	5	13	5	8	4	10	9	8	7	13
	10	20	12	15	6	12	16	13	10	9	16	10	12	11	8	10	10	11	11	9	12
Female	11	23	16	17	12	14	14	19	19	24	13	16	14	11	12	26	16	16	15	15	15
	12	10	18	13	12	10	16	12	20	12	18	16	12	10	12	16	15	9	15	15	15
	13	6	9	13	5	8	3	4	0	9	6	12	12	7	11	9	7	5	12	8	8
	14	12	11	9	12	9	11	10	14	10	9	16	12	15	12	11	9	9	10	15	13
	15	13	17	11	14	9	10	13	12	11	6	12	13	16	12	15	20	11	13	12	16
	16	7	2	9	8	10	7	3	6	-1	0	12	11	9	5	13	8	9	11	11	4
	17	4	5	0	6	-1	0	2	10	13	-2	3	4	1	5	4	0	4	10	-5	1
	18	22	18	13	13	17	18	13	7	10	16	16	14	17	7	13	10	8	13	10	11
	19	6	13	7	11	5	7	10	3	5	7	13	8	5	2	3	5	7	6	8	6
	20	14	17	10	19	19	22	17	22	16	14	22	17	19	18	21	19	16	20	13	16

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																	
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	13	13	16	15	17	15	14	16	13	12	10	10	13	12	16	16	15	14	15	14
	2	20	16	19	26	18	18	17	16	22	16	13	15	15	15	18	18	19	14	14	19
	3	3	0	3	4	5	1	3	3	6	6	7	3	7	6	6	4	7	4	8	16
	4	2	4	6	4	6	10	6	7	0	-2	3	5	0	-3	4	3	9	10	7	8
	5	9	6	5	4	7	8	6	8	3	4	6	7	6	1	4	2	7	2	6	2
	6	10	5	5	6	8	5	4	4	10	6	4	9	2	2	3	7	4	-5	-3	6
	7	-5	-5	1	0	-8	7	-3	3	1	1	-5	0	5	4	-2	5	-5	3	0	-8
	8	3	2	3	4	5	5	2	2	5	8	10	7	10	7	8	8	7	5	4	7
	9	5	5	10	8	14	10	14	3	8	7	1	4	11	4	13	7	6	8	3	7
	10	15	14	10	10	10	8	12	10	9	8	12	7	14	8	6	9	12	11	6	12
Female	11	13	12	14	19	15	7	20	16	8	17	18	18	16	13	13	12	12	22	25	17
	12	15	15	15	11	14	12	18	11	8	18	11	11	11	15	10	15	12	14	16	16
	13	13	9	8	0	9	10	9	9	11	5	9	10	10	13	5	8	6	9	5	9
	14	6	14	18	19	15	13	16	13	11	10	10	15	10	12	9	11	17	8	6	7
	15	17	19	14	13	16	13	13	13	15	12	17	13	10	16	15	12	14	9	16	11
	16	7	8	4	5	6	10	7	8	5	7	9	8	6	9	6	14	7	16	14	5
	17	1	1	3	-2	10	4	2	1	0	3	-4	-2	0	6	2	5	2	-1	4	3
	18	7	20	15	20	21	20	13	12	12	14	11	12	13	6	9	8	22	14	13	12
	19	8	2	0	4	4	10	10	1	8	9	2	9	16	10	10	5	11	11	3	8
	20	15	19	16	19	12	17	12	20	15	18	14	15	15	21	19	19	15	15	19	15

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	12	13	11	15	15	14	17	14	11	13	15	10	16	21	11	17	13	11	16	14
	2	17	17	21	15	16	15	16	17	10	17	15	17	20	23	19	18	19	23	19	21
	3	9	10	5	7	9	12	4	11	10	12	9	8	9	10	6	6	4	7	9	5
	4	12	2	3	5	4	8	3	7	8	9	11	10	5	9	10	13	12	14	9	8
	5	1	1	1	7	2	2	7	8	7	3	2	3	6	2	5	7	5	8	4	4
	6	6	2	2	0	6	4	4	5	4	9	3	9	11	9	4	5	10	9	6	15
	7	2	2	0	-8	-4	-7	-10	-3	-6	-1	-5	3	-2	0	-8	-3	-3	-6	2	-6
	8	7	9	8	9	11	8	7	7	10	9	7	4	6	7	10	9	10	8	5	9
	9	4	5	3	7	4	13	0	6	13	3	11	12	13	5	4	0	8	3	3	5
	10	8	1	9	8	9	9	4	14	6	10	14	15	9	11	11	12	11	12	7	9
Female	11	18	16	19	15	14	12	16	12	15	14	12	11	6	11	16	10	13	8	17	16
	12	14	10	20	11	11	13	15	14	14	20	16	15	21	12	10	15	10	10	11	10
	13	13	1	11	7	10	5	10	4	5	11	11	10	2	8	13	10	4	4	6	4
	14	7	9	11	9	19	11	12	8	8	5	10	16	10	13	7	13	6	13	12	10
	15	12	14	11	13	15	12	12	12	11	13	10	22	14	9	11	10	13	12	10	13
	16	7	15	7	5	1	1	2	6	9	8	9	7	10	14	4	8	13	10	9	13
	17	3	4	5	8	1	0	0	3	9	6	0	9	4	2	2	-2	0	7	3	10
	18	11	7	25	10	14	16	16	2	8	7	9	5	12	14	12	20	11	6	11	18
	19	4	2	3	5	8	7	6	11	5	7	4	7	7	4	5	3	5	3	8	7
	20	11	13	9	16	13	13	18	14	19	11	13	17	13	17	19	22	15	25	15	15

GROUP III - 90 DEGREE ANGLE

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	17	8	10	11	14	16	11	19	15	13	12	13	10	14	12	9	14	14	15	11
	2	21	15	15	14	15	15	18	15	14	11	15	16	10	8	14	20	11	13	12	16
	3	11	12	7	9	8	13	11	10	8	10	7	5	13	14	8	7	8	15	7	13
	4	23	18	12	15	16	12	13	12	12	13	12	16	16	20	12	13	12	14	17	11
	5	-5	8	5	6	2	6	9	8	3	5	10	2	5	3	3	10	10	3	8	7
	6	13	13	9	12	11	8	10	10	8	9	9	9	9	8	10	9	11	7	7	6
	7	10	11	6	10	8	9	12	10	19	11	9	10	9	13	16	16	15	15	16	15
	8	19	5	10	10	9	9	6	9	9	8	6	8	9	10	9	7	9	6	8	8
	9	8	5	8	8	8	8	9	9	10	13	11	10	12	9	12	9	14	8	7	9
	10	17	16	11	13	11	13	12	14	11	11	14	11	10	10	10	7	17	12	16	11
Female	11	20	11	15	16	16	15	13	16	17	8	13	14	15	14	16	11	18	11	13	9
	12	19	8	14	15	15	13	12	16	14	10	12	11	3	1	8	3	6	6	6	6
	13	15	15	15	16	17	10	10	17	12	8	13	14	13	15	6	7	13	16	16	16
	14	21	14	15	12	14	18	12	13	11	11	13	14	10	12	11	12	5	15	10	12
	15	9	8	5	10	4	7	5	8	11	8	3	4	6	9	6	8	11	9	9	13
	16	-3	7	8	14	12	15	8	13	13	11	8	6	21	10	8	7	8	8	-1	6
	17	11	6	2	7	8	1	6	4	3	10	8	8	9	6	8	3	10	2	11	9
	18	8	10	10	9	10	8	8	11	11	12	10	10	7	11	13	14	14	10	12	12
	19	5	8	1	5	8	3	0	6	5	4	5	4	6	7	10	6	9	6	4	10
	20	-1	11	6	17	11	6	11	9	10	13	13	12	10	16	15	13	12	11	7	8

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	15	14	16	13	13	14	9	15	14	12	6	9	11	9	6	15	15	20	20	25
	2	11	9	11	11	11	14	11	13	15	13	17	9	15	12	14	13	13	12	13	14
	3	4	5	8	5	12	4	13	8	6	5	14	12	10	8	5	6	14	11	7	8
	4	14	20	10	12	9	11	14	13	10	14	13	18	18	18	13	7	14	20	16	16
	5	7	5	6	9	12	3	8	6	6	8	5	6	8	4	2	6	5	3	9	6
	6	6	9	9	9	8	10	13	10	12	9	8	8	9	7	8	5	7	10	14	7
	7	9	15	18	23	18	17	17	24	12	10	11	12	16	17	15	12	14	17	21	19
	8	6	9	9	8	7	10	7	11	8	7	9	9	3	6	7	8	8	8	8	6
	9	7	6	15	10	6	9	11	6	7	7	13	16	8	6	4	6	4	5	5	7
	10	16	14	14	13	14	8	8	11	8	8	9	7	8	0	12	9	10	14	11	12
Female	11	9	11	10	11	19	14	11	10	8	12	10	21	10	8	10	13	15	8	12	13
	12	5	13	7	-1	3	-1	0	4	2	8	3	1	4	2	5	2	-4	-2	-4	1
	13	3	12	13	14	15	10	11	16	12	18	13	15	25	15	13	19	13	14	17	19
	14	13	12	14	11	23	20	5	17	17	16	11	10	10	11	16	8	14	15	13	9
	15	12	15	9	8	11	10	19	10	10	3	5	9	6	9	6	7	8	3	13	10
	16	5	8	10	12	15	12	13	18	9	14	7	1	8	10	7	7	15	15	8	8
	17	9	8	7	10	11	9	7	10	6	7	6	6	9	8	8	7	3	4	6	2
	18	15	11	11	11	10	10	15	12	10	11	12	14	10	13	12	11	4	1	9	16
	19	7	1	7	4	8	9	1	7	10	6	7	1	3	7	7	5	9	6	6	4
	20	15	7	8	12	8	4	7	7	10	10	9	9	7	5	14	10	12	14	8	4

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	557	58	59	60
Male	1	19	15	13	14	12	20	9	16	17	14	15	14	12	16	16	16	23	23	18	21
	2	10	14	5	7	11	10	6	5	6	6	7	6	5	5	10	9	7	13	8	7
	3	7	6	9	8	16	10	13	11	8	12	3	12	6	7	6	10	9	3	6	9
	4	16	19	13	13	11	17	19	17	9	6	10	15	12	17	21	13	16	13	13	10
	5	10	6	10	6	10	9	8	6	10	10	2	10	5	9	6	12	11	9	7	3
	6	7	4	6	8	11	8	13	7	5	7	7	8	10	10	15	10	9	10	6	13
	7	19	11	11	11	14	8	15	11	10	7	11	10	17	9	10	10	9	7	8	13
	8	10	6	8	7	8	7	9	7	6	8	8	8	6	7	8	6	6	7	8	5
	9	3	8	4	1	5	7	6	4	9	5	7	7	7	3	5	5	6	7	6	4
	10	7	4	7	9	3	6	4	11	10	10	12	10	10	13	12	14	6	8	4	10
Female	11	13	7	15	11	9	14	9	15	12	13	13	10	15	9	7	19	10	17	9	14
	12	-2	-1	-6	4	3	-2	1	3	-4	3	7	0	1	0	-4	-6	-2	-5	6	-3
	13	11	9	13	13	14	12	12	20	10	16	12	17	15	14	14	19	16	15	15	11
	14	13	10	8	9	7	10	13	14	16	8	13	16	11	11	11	16	12	12	14	6
	15	7	14	11	11	7	3	7	14	17	9	10	8	11	7	6	7	13	0	10	1
	16	8	12	9	16	17	14	13	11	6	14	16	9	14	8	14	9	12	9	10	9
	17	7	7	2	8	7	8	2	12	7	1	5	4	4	5	4	7	11	5	-1	6
	18	21	11	13	7	9	11	5	14	7	2	10	13	11	3	9	4	11	15	12	12
	19	2	3	3	6	10	6	7	9	9	8	6	7	6	10	6	3	4	1	4	1
	20	8	10	7	5	8	10	12	10	7	6	13	13	5	8	11	11	13	7	10	9

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	11	15	13	20	14	17	17	17	15	14	16	19	17	18	20	20	15	18	17	20
	2	7	3	11	10	7	6	9	8	3	7	7	10	10	7	6	2	8	7	7	8
	3	9	9	10	5	11	7	4	6	4	7	4	0	8	9	6	5	5	3	3	4
	4	13	15	21	25	28	18	15	18	18	20	21	19	18	11	12	16	15	18	20	22
	5	4	10	7	4	2	5	6	5	4	5	8	8	9	4	4	3	1	3	7	9
	6	11	7	7	6	10	3	14	8	9	8	10	9	10	10	10	8	7	8	10	9
	7	7	13	11	11	12	10	10	7	11	15	15	9	8	9	8	13	8	9	3	13
	8	10	5	5	5	6	4	9	9	5	6	6	7	3	6	5	4	7	6	4	3
	9	4	3	0	3	2	0	1	1	1	2	3	5	4	2	-1	-2	0	7	3	1
	10	12	8	10	12	11	12	12	13	13	9	16	16	17	13	14	15	11	10	10	7
Female	11	8	11	11	9	11	16	11	11	12	11	11	14	7	15	12	9	8	11	7	15
	12	0	4	5	-1	0	0	1	-3	-3	-6	0	-3	-2	1	0	-5	2	-9	-1	-9
	13	12	13	24	20	14	10	14	17	7	14	13	23	7	20	21	16	23	16	15	18
	14	11	17	11	14	16	11	10	15	10	19	13	11	5	7	11	12	10	13	10	7
	15	4	2	4	15	3	6	9	17	11	12	1	5	8	5	8	13	10	8	0	6
	16	7	14	11	4	7	9	13	11	7	13	10	6	4	11	3	6	10	5	17	16
	17	6	6	3	11	4	11	8	1	5	11	7	8	4	1	2	4	1	5	11	-7
	18	20	15	16	15	14	11	11	5	15	11	11	10	9	19	15	12	12	16	12	12
	19	4	5	9	5	2	7	4	7	10	3	11	5	6	5	2	3	3	6	4	8
	20	10	11	14	11	8	8	14	6	10	11	11	19	10	14	12	10	6	11	6	5

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	21	17	17	16	18	19	12	21	19	21	20	18	15	13	15	17	23	18	20	23
	2	4	8	8	9	9	10	10	12	12	6	8	6	3	-2	8	5	2	2	-2	5
	3	6	5	8	14	5	3	7	4	10	11	8	6	9	4	5	9	13	4	6	8
	4	14	14	16	15	19	21	24	26	23	20	18	14	16	9	16	15	10	13	19	12
	5	5	5	6	1	4	3	10	5	3	5	6	6	6	8	6	4	5	6	5	8
	6	7	11	12	13	14	9	7	8	10	12	11	11	11	10	10	11	12	7	9	13
	7	8	10	12	10	11	11	9	12	10	7	10	10	13	7	6	11	14	10	11	13
	8	3	4	6	6	8	2	9	4	6	4	6	7	7	7	5	5	7	4	6	9
	9	3	4	1	4	2	1	3	2	1	0	8	0	-1	1	3	9	-1	1	6	5
	10	13	12	10	14	12	8	12	11	12	18	11	7	13	10	18	6	7	7	15	8
Female	11	10	11	15	10	19	15	12	11	13	12	10	2	14	11	13	9	10	9	16	1
	12	-5	-7	-5	-6	-5	-14	-2	5	0	-6	-2	-3	-3	-5	-8	-3	-2	-7	-10	5
	13	13	15	18	16	14	17	17	5	13	22	24	18	19	13	15	18	15	10	18	19
	14	12	5	13	2	6	8	12	12	3	9	7	6	8	4	9	9	10	8	4	7
	15	3	9	10	13	7	11	13	8	9	9	5	4	11	11	14	0	4	9	8	2
	16	11	6	7	5	6	15	17	9	7	6	13	8	7	11	5	8	10	10	4	7
	17	5	3	-1	9	6	3	7	5	8	6	4	2	2	8	5	2	9	2	0	-4
	18	13	15	12	7	12	13	13	16	13	14	9	14	12	9	6	13	4	14	11	9
	19	9	2	6	10	8	4	4	8	6	5	4	9	5	5	2	9	3	6	3	8
	20	13	13	6	10	15	11	6	13	16	13	11	11	11	13	10	5	11	9	5	6

GROUP IV - 120 DEGREE ANGLE

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	8	1	10	10	8	9	10	7	10	12	8	10	12	9	9	10	15	13	5	9
	2	11	8	10	10	7	7	10	4	6	6	6	9	7	12	10	9	10	11	15	17
	3	6	3	11	11	8	12	8	11	12	10	10	4	10	11	9	10	12	4	7	7
	4	9	10	8	10	6	5	8	6	10	8	3	10	6	14	9	9	9	4	8	7
	5	11	10	8	9	9	13	15	7	9	12	9	9	17	13	9	7	7	12	5	5
	6	10	7	13	12	9	6	6	9	10	11	13	9	10	11	11	0	5	4	3	-8
	7	4	11	10	9	13	11	9	10	6	7	7	4	11	11	9	11	8	7	9	11
	8	7	18	11	12	13	-5	2	15	14	6	13	12	4	20	11	12	6	8	11	10
	9	4	15	5	6	2	5	2	6	5	3	1	8	4	3	2	4	7	3	0	2
	10	5	10	5	11	8	8	10	10	10	14	11	5	12	12	6	8	10	5	13	7
Female	11	13	10	16	10	10	14	10	16	11	11	12	9	10	9	11	15	8	15	11	13
	12	17	15	9	12	7	5	11	9	11	14	15	16	11	7	11	14	11	8	16	9
	13	7	4	5	8	6	3	11	7	7	11	8	12	8	6	11	4	3	2	2	5
	14	8	6	15	6	9	10	11	11	11	6	9	13	5	7	9	5	9	8	8	9
	15	-1	-3	-2	2	1	0	1	1	1	5	3	4	4	4	-2	0	4	-3	0	-1
	16	17	8	11	13	4	12	10	6	13	11	5	15	5	21	8	16	7	11	12	9
	17	5	10	11	6	2	9	3	5	7	10	11	6	4	11	4	3	6	9	10	8
	18	3	0	-3	5	3	7	2	2	7	4	0	6	-1	8	3	5	2	5	3	6
	19	14	10	11	12	12	11	12	16	10	12	12	10	13	11	12	11	16	14	16	12
	20	14	14	21	17	19	14	10	5	6	12	8	10	12	4	0	17	0	13	14	18

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	14	10	6	9	3	11	10	12	12	5	7	8	8	5	11	9	9	10	11	6
	2	17	11	10	5	11	8	7	9	4	7	12	6	5	5	2	10	11	5	7	9
	3	9	5	6	8	12	13	7	5	8	6	10	6	5	4	1	7	7	9	7	5
	4	6	11	4	11	10	9	9	7	10	8	6	5	5	1	8	8	6	5	12	10
	5	10	13	11	7	13	9	6	10	11	10	3	6	10	7	6	8	6	9	9	13
	6	6	6	10	2	8	10	12	13	12	8	8	11	4	11	9	7	10	0	-12	2
	7	7	9	8	6	8	5	7	7	5	8	5	5	10	7	5	6	2	7	7	7
	8	15	8	9	7	2	9	5	4	4	14	8	10	8	8	10	8	0	2	17	9
	9	0	6	1	2	2	2	2	3	4	6	2	3	1	1	4	1	4	2	3	1
	10	8	13	6	11	11	7	11	12	10	10	11	6	6	10	7	11	12	7	5	6
Female	11	16	17	11	11	14	9	9	11	14	12	6	12	13	14	13	10	13	15	10	10
	12	15	12	6	9	10	11	6	12	8	7	9	11	11	15	4	11	13	8	10	9
	13	8	10	5	5	3	3	9	5	6	6	6	4	6	10	1	4	9	3	9	7
	14	7	5	7	6	8	6	6	11	7	7	12	10	9	7	7	5	10	7	4	6
	15	1	0	-3	3	-6	0	3	-4	1	-1	1	5	6	4	0	2	-1	-1	5	0
	16	11	11	20	17	9	10	12	8	14	6	15	13	13	6	15	15	9	7	4	8
	17	11	7	6	11	10	9	6	10	9	3	11	5	8	8	8	6	11	9	7	6
	18	4	3	6	2	4	6	4	7	2	4	4	4	7	2	6	4	-1	0	1	5
	19	17	7	8	21	11	11	12	13	13	10	10	10	14	9	8	10	11	9	8	13
	20	10	5	13	6	20	17	18	7	6	19	17	23	6	16	5	7	13	12	16	6

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	10	6	8	12	11	7	11	7	8	8	5	5	11	10	9	7	8	11	11	10
	2	6	7	7	6	10	9	10	5	4	6	16	8	12	13	12	8	11	8	10	8
	3	-1	10	10	8	1	9	10	11	9	9	9	4	5	6	5	10	7	4	8	4
	4	7	9	10	10	10	12	17	10	0	11	4	9	13	12	7	9	11	12	17	9
	5	11	5	9	9	7	4	-1	9	14	6	10	7	11	7	7	10	10	5	12	11
	6	3	7	10	-1	8	11	8	5	5	11	15	9	7	9	17	3	7	-5	11	13
	7	6	9	9	8	10	7	5	9	7	9	15	8	10	10	17	8	5	2	4	7
	8	11	6	13	5	12	2	2	14	16	8	4	7	2	10	5	1	-3	10	2	4
	9	-3	5	4	2	3	4	1	-1	2	5	-1	-1	1	2	5	2	2	1	2	-1
	10	10	7	9	4	9	5	12	10	9	4	7	8	5	9	11	10	3	8	9	5
Female	11	12	10	5	18	8	17	17	13	12	10	12	11	14	15	8	10	15	10	9	13
	12	13	12	10	7	10	11	13	8	14	9	15	8	9	7	13	12	15	15	14	14
	13	4	8	3	7	5	9	2	10	6	9	8	8	8	10	3	1	3	5	9	8
	14	1	10	10	7	6	6	9	3	6	7	12	11	14	7	13	6	9	10	11	9
	15	-1	0	8	7	6	3	-3	-1	-1	-1	4	2	2	4	4	2	8	5	7	2
	16	8	9	16	18	10	11	9	11	17	11	4	9	5	9	8	9	8	8	6	16
	17	4	4	4	5	4	3	3	9	3	3	9	6	6	12	7	6	4	5	10	10
	18	-1	2	5	2	6	3	4	-1	0	3	-1	7	2	3	-5	4	5	-4	1	10
	19	13	11	10	10	10	13	7	9	8	5	9	11	7	9	12	13	9	9	13	17
	20	8	23	17	11	21	2	8	2	17	31	17	8	16	18	24	26	10	27	29	23

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	9	10	7	11	7	8	7	9	9	9	7	7	9	12	8	6	12	2	5	7
	2	10	10	7	9	8	10	11	9	8	10	7	12	11	11	10	6	2	1	5	3
	3	10	9	8	13	10	6	5	12	8	7	7	8	10	2	11	12	7	3	4	3
	4	10	8	9	7	8	10	1	10	7	9	11	1	8	10	15	13	9	7	9	11
	5	4	12	6	9	8	3	8	5	8	7	11	7	8	7	7	8	9	4	7	0
	6	12	12	11	9	6	10	12	6	10	10	13	5	6	4	13	20	8	6	10	12
	7	8	8	12	8	6	12	5	7	6	6	2	4	4	11	10	8	13	9	15	9
	8	9	3	10	8	7	7	7	13	14	12	-2	11	6	2	13	17	-1	14	0	10
	9	2	0	0	2	5	-1	-1	1	3	3	4	0	4	-1	5	0	6	0	1	1
	10	5	8	7	6	6	4	5	10	8	10	5	6	7	4	5	11	9	8	9	6
Female	11	11	11	6	10	10	8	10	12	12	11	13	15	8	8	14	10	7	12	8	5
	12	9	15	10	10	10	17	18	16	11	13	13	22	18	14	8	16	13	13	14	10
	13	11	9	10	0	8	7	6	6	0	6	2	1	5	4	0	5	-5	4	8	7
	14	10	4	6	6	10	8	7	14	8	3	9	11	11	10	8	8	1	9	8	10
	15	5	4	3	4	-1	3	5	4	4	5	0	5	4	3	3	2	-2	5	-4	-1
	16	2	12	18	11	22	14	13	18	7	17	9	6	15	14	4	7	15	13	19	16
	17	1	5	1	2	9	2	3	8	4	7	3	8	6	6	6	6	6	5	4	11
	18	8	11	7	2	5	11	10	10	6	9	-1	6	1	1	1	1	5	4	-1	0
	19	9	10	10	8	11	8	12	11	8	8	7	3	13	8	9	11	10	8	17	7
	20	10	4	17	21	19	1	6	19	14	10	19	15	24	7	1	2	19	5	12	-1

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	9	12	6	7	8	8	8	7	10	5	7	8	8	7	8	4	5	4	6	4
	2	6	9	6	5	7	9	10	10	7	11	6	10	13	9	12	9	11	9	7	12
	3	0	8	11	7	10	11	15	12	10	13	9	3	5	7	8	4	5	11	0	4
	4	7	10	5	6	8	12	14	12	17	11	7	8	5	4	9	11	9	7	14	16
	5	14	12	6	-1	6	10	7	10	4	6	13	10	-5	8	2	7	9	4	8	4
	6	11	7	3	1	0	11	5	1	7	3	8	14	9	12	-1	6	6	5	0	8
	7	6	15	3	3	7	-2	9	8	12	8	4	2	7	6	7	10	3	6	-2	4
	8	18	11	-9	-7	6	2	7	-4	4	11	13	6	6	6	3	6	10	4	17	9
	9	1	6	-1	6	2	1	4	0	4	2	0	0	0	5	4	0	4	3	0	4
	10	7	8	6	7	4	7	6	7	5	7	10	9	11	7	11	6	6	6	7	5
Female	11	8	10	10	7	6	10	12	9	11	5	13	10	9	13	5	11	11	11	9	7
	12	13	9	12	9	14	14	14	16	13	10	9	15	12	12	14	17	18	13	11	15
	13	10	6	3	4	3	7	0	-1	9	9	10	4	5	3	2	10	9	4	3	0
	14	5	10	11	10	5	11	11	10	9	6	12	12	8	7	8	8	8	7	5	9
	15	-1	-6	3	3	-2	2	0	0	0	-3	9	-3	-4	10	-2	-1	2	1	1	0
	16	9	9	7	10	13	11	4	9	15	11	16	8	10	15	11	5	3	7	8	14
	17	12	2	6	4	1	2	6	11	2	2	7	7	10	7	9	11	7	8	7	8
	18	4	-1	8	-3	3	6	7	-2	4	5	8	0	7	5	6	5	0	5	4	1
	19	10	7	11	9	11	8	10	6	5	8	5	13	7	15	3	9	5	9	4	7
	20	13	6	6	27	6	3	-3	15	12	8	20	6	11	-1	12	20	7	9	21	13

APPENDIX D

RAW DATA FOR EXPERIMENT 4

GROUP I - WHITE HORIZONTAL LINE

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	11	10	7	11	10	10	10	9	8	5	6	10	8	8	3	7	3	0	1	7
	2	8	-1	4	7	7	7	9	15	3	9	10	18	11	10	11	14	6	11	6	11
	3	13	9	13	10	11	15	12	9	12	12	23	11	19	15	12	20	12	16	9	22
	4	7	10	8	6	9	8	10	6	9	10	9	9	9	3	8	9	14	12	14	13
	5	5	10	9	6	12	10	8	10	6	7	2	9	7	3	3	3	5	2	2	4
	6	10	7	6	6	5	4	7	6	6	3	7	7	7	5	10	8	9	10	5	9
	7	7	12	7	11	6	19	6	6	9	8	7	14	14	12	10	8	11	13	7	10
	8	11	4	5	2	3	7	2	6	-1	2	5	2	2	2	1	1	0	-2	0	3
	9	9	-1	-2	2	1	0	3	-1	0	2	0	0	0	8	6	2	5	2	6	4
	10	6	6	5	6	5	5	7	6	7	9	10	3	10	0	3	9	9	10	-1	7
Female	11	2	2	3	8	10	4	6	12	7	6	6	11	6	9	11	12	5	5	6	3
	12	13	3	11	10	12	13	10	10	6	14	8	9	10	6	9	10	6	11	10	10
	13	13	15	14	10	15	9	8	14	12	10	10	14	3	3	8	7	4	14	14	11
	14	2	7	7	8	2	6	-1	-1	-3	1	12	0	8	14	4	3	11	12	5	6
	15	14	6	8	4	6	7	7	6	9	11	8	3	5	9	5	6	5	5	9	5
	16	12	10	14	12	8	9	13	10	4	3	5	11	10	19	10	7	16	12	7	12
	17	17	18	16	7	11	15	7	5	16	5	10	7	16	16	7	3	16	13	17	17
	18	8	16	8	8	11	6	5	13	8	9	8	10	11	12	7	9	13	8	10	15
	19	6	2	2	3	1	-1	-1	-1	2	2	1	0	-3	2	0	-3	5	1	-1	4
	20	18	13	11	10	11	8	11	15	10	7	14	9	9	11	22	10	14	10	12	13

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	1	3	3	7	5	6	2	2	-2	6	5	7	3	1	2	2	0	7	2	6
	2	7	6	8	13	11	10	8	13	4	8	8	5	8	2	5	4	5	4	6	9
	3	13	9	15	20	10	6	16	15	7	9	17	1	19	14	19	17	12	12	14	18
	4	7	13	14	7	6	2	10	8	7	4	6	8	4	12	1	12	8	7	8	8
	5	7	3	5	5	5	-4	1	-8	-8	6	-1	-6	-11	-1	5	-4	-8	0	10	5
	6	6	9	5	10	10	3	8	12	9	6	10	4	8	3	8	9	8	11	5	7
	7	18	10	11	12	9	14	9	11	12	5	7	8	6	8	8	8	10	15	8	5
	8	0	-1	1	1	1	-2	-2	-3	3	1	0	-1	3	2	-1	-5	-5	-7	-8	-6
	9	4	9	9	12	9	7	4	8	8	8	5	1	4	10	5	5	0	2	1	0
	10	0	-1	16	12	15	2	14	10	13	12	3	4	2	3	9	5	17	11	2	5
Female	11	3	8	10	2	11	8	2	8	3	10	12	7	2	13	2	5	11	6	10	8
	12	8	8	12	8	4	8	8	8	8	10	12	7	8	6	11	5	8	5	5	8
	13	14	15	8	10	10	10	7	12	11	14	10	6	10	12	9	3	10	11	4	7
	14	8	1	1	9	-2	7	9	5	3	9	0	7	8	5	9	9	7	11	10	8
	15	12	2	0	5	10	4	7	9	11	7	13	13	9	4	7	4	7	8	9	13
	16	13	10	10	15	17	20	18	12	13	18	10	17	18	12	9	17	13	11	22	15
	17	16	7	9	10	14	15	12	19	14	10	15	13	14	12	14	11	6	4	10	14
	18	8	9	2	16	19	9	9	6	10	8	9	9	5	6	7	6	8	6	3	8
	19	3	-3	0	-3	-3	-1	-1	-5	-2	0	2	-1	-2	2	-2	-3	-2	1	-2	3
	20	8	13	14	8	4	7	9	9	11	11	8	10	15	13	5	10	9	15	7	12

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	0	1	-1	3	0	2	1	1	-2	1	3	3	0	5	1	1	4	2	2	0
	2	6	9	10	2	7	9	7	11	6	5	8	8	6	5	7	4	9	4	9	0
	3	21	15	14	7	6	17	18	18	9	13	19	24	10	11	25	24	10	15	20	23
	4	3	9	9	10	13	11	7	3	6	8	6	10	11	12	8	7	9	-1	3	4
	5	-4	0	3	7	0	5	-3	-3	1	-9	5	9	-7	0	0	-7	0	5	8	3
	6	2	5	4	3	6	10	4	4	4	5	3	2	11	6	8	9	3	4	5	4
	7	5	9	9	13	8	12	8	12	7	9	11	10	8	11	12	6	4	11	2	9
	8	-3	-8	-2	-3	3	-3	-3	-2	-5	-4	-8	-6	-5	-2	-4	-3	0	-2	-2	-3
	9	2	4	4	1	4	2	0	0	3	-5	6	8	7	-2	5	1	1	8	0	6
	10	11	12	10	7	4	-2	3	8	11	11	9	12	19	17	14	11	2	-1	-3	2
Female	11	3	1	3	9	4	12	3	13	11	10	2	5	11	8	7	2	0	1	5	13
	12	6	6	7	7	8	8	5	9	8	7	8	10	10	13	9	9	8	5	10	8
	13	6	6	11	18	10	12	14	9	10	9	6	16	9	6	9	12	11	6	10	8
	14	6	4	10	7	13	12	10	8	7	10	9	2	11	4	5	7	2	5	7	2
	15	5	6	11	10	11	6	4	1	10	11	9	2	0	2	3	4	5	3	5	4
	16	18	12	12	11	9	12	6	9	9	12	16	3	12	4	7	9	7	3	13	7
	17	14	17	7	15	9	10	18	13	10	14	15	11	11	13	13	11	5	9	17	14
	18	2	-2	-5	12	-6	-3	-2	-6	3	6	1	4	3	3	-2	2	6	1	-4	3
	19	-5	3	0	-6	-1	-3	1	-1	-3	-4	-5	-1	-3	-1	-2	-1	0	2	1	-3
	20	15	9	9	8	14	10	14	12	12	6	7	9	16	9	6	6	13	9	12	18

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	4	0	-1	1	3	3	2	1	1	2	2	2	1	3	6	8	-3	2	3	4
	2	7	2	6	5	5	9	3	7	4	9	12	2	7	7	18	7	4	4	12	11
	3	10	20	22	12	7	13	24	8	13	22	15	22	21	10	11	21	14	11	21	12
	4	8	6	0	2	3	5	9	9	4	5	9	4	1	3	0	-4	4	-3	2	3
	5	5	0	-5	1	-5	-6	5	0	9	-5	0	-2	5	6	9	-3	-2	-4	5	1
	6	6	6	2	4	5	4	4	0	4	-1	4	3	2	3	4	1	1	1	0	4
	7	10	10	10	8	9	12	12	9	8	12	13	7	11	19	9	21	11	6	17	17
	8	-6	-8	-4	-2	1	-6	-3	-2	0	-4	-4	-3	-5	-1	-5	-1	-2	-5	-2	-3
	9	3	2	6	-1	-3	0	-2	5	3	-1	-2	1	-1	3	0	-1	-1	2	-2	2
	10	18	4	11	14	4	8	4	10	7	15	5	-3	13	15	10	9	8	8	6	2
Female	11	14	6	6	9	11	3	9	6	4	7	9	6	8	10	11	10	5	5	4	8
	12	9	6	7	6	6	0	10	8	5	5	6	6	4	4	4	6	10	6	9	8
	13	8	10	10	9	10	8	8	5	11	8	12	13	10	13	7	12	9	12	3	9
	14	8	5	14	10	11	13	4	9	5	24	12	0	9	15	9	9	10	10	13	8
	15	5	2	3	4	10	4	5	8	3	3	7	5	7	5	1	8	4	2	0	4
	16	11	-1	1	-2	3	0	3	-4	10	-1	3	8	7	4	13	4	-1	10	1	9
	17	8	10	16	9	11	9	17	11	14	19	12	17	9	8	14	12	13	7	20	11
	18	10	0	4	6	3	4	-2	1	10	6	7	-3	2	1	5	2	3	3	4	-5
	19	6	-1	1	-8	4	-2	0	1	3	-4	-2	-2	-5	3	0	6	1	-6	1	-1
	20	10	11	12	10	11	8	11	12	7	16	11	5	16	10	13	15	7	14	8	12

GROUP I (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	2	0	3	-2	1	3	5	0	1	3	0	3	1	2	0	1	1	3	1	3
	2	6	2	8	11	11	2	5	7	5	2	7	11	11	4	9	7	8	7	2	5
	3	24	15	12	20	6	21	12	10	16	10	11	9	20	23	10	24	18	25	23	6
	4	1	8	-1	11	12	3	4	6	5	-4	4	6	8	3	2	7	3	4	0	10
	5	-5	4	0	-1	5	6	-7	3	-1	-2	1	0	1	0	8	0	-1	5	8	8
	6	2	3	3	7	1	1	4	4	-1	2	1	7	5	6	1	0	4	2	5	0
	7	14	17	11	7	7	7	16	12	6	5	8	-1	7	12	9	9	11	13	9	8
	8	-4	-3	-4	-3	-2	-4	-4	0	-4	1	-3	-7	-5	1	0	-4	-1	-6	0	-4
	9	0	3	-1	0	1	5	6	-1	6	4	1	2	2	8	1	6	5	6	1	3
	10	1	7	5	4	6	11	2	9	9	5	7	4	6	1	9	3	2	0	-6	5
Female	11	12	11	9	7	11	8	5	10	5	9	6	6	11	11	10	5	7	3	10	5
	12	4	11	6	7	8	8	-1	6	7	11	9	8	2	10	11	5	4	11	9	8
	13	10	10	13	11	10	16	6	11	10	9	18	6	11	11	8	10	10	12	8	11
	14	10	8	8	7	0	11	9	11	11	3	13	3	5	6	9	10	8	9	4	3
	15	5	6	6	3	2	6	3	4	4	3	0	3	3	4	0	-3	4	-3	1	6
	16	9	17	18	10	12	11	16	15	12	5	16	5	0	12	11	6	8	17	10	16
	17	12	16	13	16	7	7	9	14	13	14	10	7	16	12	14	8	13	3	18	4
	18	-5	-3	5	5	5	1	0	8	5	13	2	8	-3	4	-4	2	1	5	-6	13
	19	-3	-7	-7	0	-1	-3	-5	-4	-1	-2	-1	0	-2	-5	-2	3	2	2	-2	0
	20	14	18	9	9	14	15	15	17	15	9	18	8	12	7	3	19	11	6	1	11

GROUP II - LIGHT GRAY HORIZONTAL LINE

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	11	14	12	6	7	8	5	7	8	8	4	6	4	7	6	6	4	5	7	5
	2	16	18	11	14	14	15	17	16	13	17	18	17	17	19	21	15	18	18	17	19
	3	12	11	8	11	7	14	11	9	6	10	11	7	7	9	6	10	12	6	13	12
	4	15	14	14	13	13	14	11	13	10	14	15	11	18	12	11	11	13	9	10	9
	5	12	11	9	9	12	6	7	11	12	9	5	8	6	9	7	7	7	9	8	4
	6	8	14	15	8	8	12	14	9	13	9	8	11	10	8	9	7	9	9	8	6
	7	7	11	12	9	14	6	7	5	6	5	6	6	4	7	11	6	7	5	7	1
	8	3	2	1	5	4	5	3	9	9	3	3	9	7	2	5	8	0	-2	2	4
	9	4	12	11	5	10	11	10	6	10	8	8	8	9	9	8	11	10	7	10	10
	10	-2	5	7	2	1	5	3	9	12	1	7	9	13	11	8	11	11	8	12	11
Female	11	14	9	7	10	13	14	14	15	8	12	7	8	7	10	12	9	9	6	7	8
	12	11	15	13	9	12	8	7	9	9	11	9	11	9	16	11	10	10	13	13	7
	13	14	16	13	16	20	17	15	19	17	10	12	13	25	11	11	10	16	14	14	13
	14	7	15	9	6	11	11	13	14	15	14	9	12	17	10	13	11	17	8	16	14
	15	19	17	19	19	18	8	14	14	12	14	14	11	10	12	6	5	11	16	17	13
	16	18	15	13	14	17	11	15	21	12	18	18	20	12	7	16	14	13	9	12	9
	17	16	17	8	8	7	7	8	6	7	3	4	8	6	9	4	9	6	12	8	12
	18	6	7	3	9	11	4	12	7	4	14	6	11	13	10	6	5	9	6	9	2
	19	4	8	7	7	15	20	17	14	21	11	21	11	10	15	12	11	8	12	13	11
	20	20	13	15	10	15	14	13	13	12	10	15	15	7	4	5	5	8	4	9	6

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	9	7	7	7	7	8	5	5	10	8	9	10	12	8	8	9	10	6	10	11
	2	17	16	20	14	14	18	18	14	17	14	18	22	15	17	12	16	19	18	20	16
	3	9	14	8	12	10	10	12	7	16	15	10	14	13	19	12	9	12	12	11	11
	4	12	10	7	10	9	9	4	10	8	7	7	7	10	11	8	10	5	7	9	11
	5	4	6	7	7	8	12	7	10	5	3	7	6	5	10	10	4	6	3	6	9
	6	9	8	8	10	7	4	2	3	6	4	5	7	2	6	6	5	4	0	1	3
	7	6	11	13	7	7	7	2	7	7	10	8	4	6	6	3	5	3	4	7	4
	8	-2	8	5	3	4	-5	0	0	1	5	10	-1	-1	1	0	6	0	2	0	-3
	9	13	9	8	4	12	10	7	9	12	11	9	8	7	9	8	7	7	7	9	7
	10	12	0	2	1	-2	2	0	3	-2	-2	-1	4	4	-3	-1	-3	2	0	0	2
Female	11	9	6	8	10	8	6	11	10	9	9	7	9	8	10	8	10	6	7	9	9
	12	3	3	3	7	13	10	3	11	11	9	12	11	12	6	8	-3	4	8	6	2
	13	7	13	11	11	10	12	13	17	10	12	8	14	9	10	14	9	10	20	9	12
	14	5	8	4	12	17	9	5	14	14	11	8	3	9	14	8	1	9	13	10	5
	15	11	11	10	14	7	9	9	14	8	17	10	14	10	14	7	10	10	9	9	14
	16	10	19	11	17	12	17	14	12	12	13	11	15	12	14	13	10	10	14	14	16
	17	8	7	3	6	6	10	5	13	12	5	3	5	6	14	12	6	7	10	14	15
	18	-1	1	-3	-2	-3	2	-7	7	-2	3	-3	6	4	8	3	1	0	4	-4	3
	19	22	10	19	18	18	8	16	14	10	14	9	11	9	16	16	14	11	12	18	11
	20	10	8	5	2	6	7	9	8	6	8	4	11	5	7	6	14	12	9	11	10

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	10	8	6	11	7	8	8	8	10	8	7	7	9	8	4	6	1	10	10	11
	2	16	20	16	13	18	19	12	10	17	13	15	19	20	14	11	15	19	18	21	17
	3	8	6	4	11	6	8	7	7	13	8	4	7	3	9	9	7	4	15	12	12
	4	7	9	11	8	8	7	7	9	5	5	8	9	9	6	6	15	11	9	3	9
	5	10	11	5	7	9	7	7	2	5	9	1	5	9	9	10	8	9	5	10	7
	6	2	-5	1	3	0	1	1	2	-5	1	-1	0	-2	-5	5	-1	-3	-4	-2	-1
	7	6	3	4	7	8	6	6	6	5	6	6	4	4	7	7	4	6	8	6	9
	8	0	-2	0	-5	-5	2	-2	2	7	2	0	1	2	2	-2	3	-5	-3	-2	0
	9	9	10	10	7	7	2	7	9	8	6	4	10	12	6	10	6	8	7	4	3
	10	-1	3	1	4	7	4	1	0	4	3	1	6	1	8	-1	5	0	5	2	4
Female	11	8	11	8	9	9	5	6	10	5	7	13	8	12	19	10	6	9	8	5	8
	12	6	7	7	7	7	11	7	8	11	5	9	9	5	12	5	10	6	5	12	7
	13	11	17	17	12	13	11	8	12	10	11	9	11	13	14	23	4	10	10	16	9
	14	13	13	4	12	10	8	12	2	10	8	6	12	10	10	9	13	7	10	-1	9
	15	7	9	12	5	11	8	12	13	17	10	12	10	11	5	8	10	13	9	10	9
	16	11	11	16	14	16	15	12	8	12	14	15	17	21	15	14	15	12	12	19	20
	17	10	6	11	8	7	9	7	8	10	4	6	5	6	10	10	4	10	9	11	12
	18	6	-2	0	10	3	7	2	1	0	7	1	2	-1	1	2	1	4	5	4	4
	19	11	11	14	13	12	7	12	12	13	12	7	13	10	10	13	10	11	5	12	10
	20	11	10	10	7	6	8	9	11	7	7	3	7	7	7	9	11	10	6	6	7

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	8	8	8	5	5	6	4	7	4	5	9	11	11	7	8	7	11	5	5	6
	2	21	18	18	20	15	11	18	23	12	15	11	20	13	15	27	20	13	7	11	18
	3	7	10	10	7	10	6	13	13	12	7	8	11	9	11	7	14	8	2	9	6
	4	14	11	5	-3	7	8	13	12	9	6	7	7	9	3	6	4	4	0	10	9
	5	9	9	5	11	6	8	7	5	9	10	5	9	9	7	10	6	6	6	9	10
	6	-2	-5	-1	3	0	-4	0	0	-7	-2	-2	2	-6	-1	-1	-4	-3	0	0	3
	7	4	4	5	6	-3	9	1	1	2	15	0	7	9	0	4	7	5	5	6	2
	8	1	4	-2	-2	1	2	5	0	-4	0	2	2	5	-5	1	2	-2	2	4	0
	9	6	5	5	5	11	10	11	5	10	8	6	12	8	4	11	9	10	12	10	7
	10	2	-2	-6	7	6	4	4	-1	5	7	5	0	-7	7	9	3	8	10	4	6
Female	11	6	6	9	6	4	6	9	1	5	6	5	6	10	8	6	10	5	12	11	8
	12	10	9	9	9	11	8	5	7	15	10	9	8	12	10	16	7	12	7	9	10
	13	8	12	9	11	12	9	7	7	5	7	7	11	8	7	10	7	11	9	5	7
	14	9	6	5	15	5	11	13	14	1	5	4	9	10	5	8	8	6	14	4	7
	15	9	13	17	15	11	11	15	12	11	11	15	13	18	12	7	6	13	9	4	5
	16	20	8	13	15	12	10	11	14	10	16	8	15	12	8	10	14	16	16	10	9
	17	12	9	9	7	12	9	8	13	7	12	5	13	8	12	4	1	7	10	12	6
	18	1	5	0	-1	5	11	7	5	6	5	6	0	1	1	2	1	6	3	-4	7
	19	4	11	4	9	14	5	4	12	5	16	8	12	11	9	8	4	7	7	9	6
	20	7	6	10	6	8	6	6	7	6	7	8	10	4	11	9	4	11	11	8	6

GROUP II (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	6	7	6	7	6	7	11	2	7	5	10	4	8	9	6	10	9	7	4	8
	2	16	21	20	10	20	9	22	24	11	9	24	18	14	14	13	15	22	21	24	27
	3	9	1	6	6	1	5	10	3	9	9	5	9	7	6	18	6	7	7	14	10
	4	10	4	11	5	2	9	6	4	8	4	13	13	7	7	1	10	16	9	14	8
	5	9	4	6	5	5	6	9	-1	9	9	8	4	9	1	10	9	6	10	11	1
	6	1	1	-1	0	-3	-1	-6	1	-7	-2	2	-5	-1	-2	-7	-5	-5	-1	-6	-8
	7	4	2	6	-3	7	1	4	2	0	3	4	4	0	6	3	6	5	-1	3	2
	8	1	1	2	1	2	4	2	4	5	-2	3	1	-4	-3	-3	-1	-2	0	-6	4
	9	9	8	-1	6	9	9	8	10	2	3	8	11	3	10	8	2	9	2	8	9
	10	8	4	2	13	-1	3	-1	1	9	1	-1	1	6	0	8	-2	10	-3	9	-6
Female	11	8	7	10	5	7	3	2	7	7	8	2	7	3	6	1	5	6	6	10	6
	12	10	5	7	6	8	4	14	2	8	6	10	6	9	10	9	6	7	11	8	11
	13	9	8	9	11	6	9	10	6	6	9	9	14	12	12	12	7	7	7	19	13
	14	10	3	7	11	9	3	2	9	6	11	2	12	2	1	6	10	4	10	3	5
	15	9	10	8	3	12	7	6	12	7	15	0	10	3	9	14	4	17	0	9	11
	16	12	13	13	13	17	14	12	14	8	5	17	13	14	9	15	7	17	14	11	8
	17	7	16	9	15	11	7	11	17	5	10	13	8	11	8	13	2	14	8	1	12
	18	8	2	-2	4	7	3	2	1	4	6	0	6	6	5	-1	5	-4	7	7	10
	19	6	9	7	7	14	-2	-1	2	6	5	-1	-3	2	3	9	10	7	6	6	1
	20	10	11	9	7	5	7	8	8	13	7	7	2	8	7	8	9	7	9	5	4

GROUP III - DARK GRAY HORIZONTAL LINE

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male	1	7	12	9	12	10	14	9	11	10	9	6	10	6	12	10	8	6	6	9	6
	2	5	9	5	9	4	6	8	9	7	5	8	5	3	5	9	4	7	8	6	4
	3	11	10	12	9	7	7	11	8	10	8	5	5	2	3	10	7	9	2	7	3
	4	11	10	16	-1	9	7	4	9	4	3	5	6	10	10	5	12	7	15	10	3
	5	10	4	4	9	5	2	7	6	10	3	4	6	9	9	9	7	8	5	5	6
	6	-2	-1	-7	0	2	7	1	0	5	-3	-4	5	9	-2	5	4	4	4	4	-1
	7	13	7	10	9	2	6	5	7	3	2	0	2	8	1	4	3	5	-2	5	7
	8	7	8	7	5	11	10	8	9	10	14	6	7	8	11	13	9	7	7	4	5
	9	2	6	8	10	10	6	10	8	6	7	6	8	8	11	8	4	6	2	0	6
	10	0	1	6	5	8	3	2	2	8	4	5	5	4	5	8	5	8	8	5	8
Female	11	3	1	6	8	3	1	4	6	5	6	6	5	3	4	3	5	6	11	3	4
	12	11	7	12	9	13	10	11	11	11	7	10	11	9	16	14	15	13	12	17	12
	13	0	12	5	5	4	5	4	4	9	10	10	11	7	6	7	6	4	11	3	5
	14	6	5	6	10	10	11	7	9	7	9	6	13	6	8	13	6	8	9	1	8
	15	25	17	16	9	16	13	14	13	10	11	14	11	12	17	13	3	16	12	7	8
	16	15	12	12	8	9	9	4	5	6	5	9	9	9	7	4	8	6	3	3	6
	17	12	4	4	2	7	5	8	3	3	4	5	5	3	9	5	16	7	2	11	14
	18	0	7	5	-2	0	-1	6	1	2	1	1	-1	-3	1	-5	-1	2	-3	-9	-6
	19	7	8	4	8	10	4	3	3	6	9	4	2	7	1	3	3	7	5	10	1
	20	30	13	19	4	10	7	8	8	14	5	12	13	4	9	6	10	11	13	12	8

GROUP III (Continued)
MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	8	13	5	4	11	13	2	2	11	8	3	5	7	4	1	7	2	4	5	6
	2	9	10	13	5	6	9	9	7	8	6	6	5	5	7	6	6	11	10	10	6
	3	1	2	4	3	9	11	8	11	-2	6	3	9	1	6	6	2	4	6	2	-4
	4	6	10	6	5	13	1	11	5	16	4	5	9	12	1	5	8	9	7	9	10
	5	8	0	6	2	7	10	6	8	5	0	8	-3	4	-5	-2	2	3	3	0	-3
	6	2	0	2	2	2	1	0	1	-1	-3	-1	2	6	-1	5	0	-3	0	0	-1
	7	4	1	1	5	3	2	14	5	7	5	5	5	3	5	9	0	3	3	2	6
	8	10	14	4	3	5	6	5	4	4	4	5	7	4	1	1	6	2	4	3	5
	9	-4	-1	2	8	11	8	11	7	12	11	7	7	5	5	11	5	6	13	4	-3
	10	8	9	3	5	4	5	9	7	4	7	4	9	3	5	5	5	10	9	6	2
Female	11	4	5	7	5	6	2	2	6	7	5	0	3	2	3	4	3	9	0	6	7
	12	6	10	7	10	11	11	9	13	15	10	10	13	7	12	17	10	17	17	14	15
	13	9	7	-2	4	2	6	6	3	6	9	10	5	7	13	5	5	1	2	0	6
	14	6	4	3	2	2	7	10	7	11	7	11	-3	-1	2	11	5	8	3	5	2
	15	10	11	10	6	15	2	10	12	16	11	8	13	11	9	11	2	9	10	2	11
	16	13	8	6	6	8	15	9	5	4	7	7	6	4	10	9	11	11	6	13	8
	17	6	10	5	8	9	12	11	10	15	7	7	12	7	5	8	7	10	4	5	0
	18	-1	-3	1	-2	-1	0	0	-1	-3	-4	-1	-5	-5	-5	-7	0	-5	-5	-3	-2
	19	1	-3	-1	2	4	-1	-5	0	9	-3	-1	-3	-3	0	1	6	-4	-6	-2	2
	20	7	16	8	14	16	17	0	19	7	12	17	15	4	13	8	6	15	18	9	14

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	5	5	9	10	8	1	5	5	6	5	6	3	3	5	3	4	4	3	4	3
	2	8	8	8	7	7	5	6	8	6	9	5	7	6	6	4	5	8	7	7	7
	3	-3	6	9	4	3	4	11	7	0	1	-2	6	3	6	0	-2	4	7	8	4
	4	14	9	6	4	5	2	5	6	14	11	9	5	5	6	10	10	5	7	8	5
	5	2	9	2	6	0	2	5	-1	-3	5	7	7	1	0	5	5	6	13	-4	-3
	6	1	4	-2	4	-3	-1	1	0	-1	0	-4	2	4	2	2	-1	2	8	1	7
	7	7	2	4	3	4	8	4	3	6	6	5	2	5	10	7	5	7	5	5	2
	8	2	3	4	-1	2	0	2	-1	5	-3	2	-2	2	4	1	0	1	-1	3	3
	9	-4	-4	3	3	0	4	-1	5	7	6	12	4	1	1	2	-1	5	4	5	14
	10	4	5	0	4	6	6	6	5	6	6	8	7	5	8	9	7	6	13	8	2
Female	11	9	2	0	4	0	5	7	2	-2	8	4	0	0	3	4	10	5	2	0	-3
	12	19	15	5	12	16	2	17	15	13	19	11	3	8	8	11	14	10	2	11	3
	13	6	9	5	1	6	3	12	3	9	1	5	8	8	0	8	8	6	0	1	7
	14	-2	6	1	0	-1	-4	-4	-5	-3	-5	2	-1	1	2	-3	-4	2	1	1	-2
	15	7	3	9	9	12	13	11	13	9	1	7	3	6	7	10	9	8	5	7	8
	16	7	8	9	3	9	6	2	7	6	6	8	6	7	7	7	8	9	4	6	6
	17	7	3	5	5	3	2	5	9	12	4	8	3	6	11	7	4	4	4	13	2
	18	-2	1	-4	-5	-3	-3	0	-2	-4	-1	-4	-1	-3	-1	1	2	-2	-1	1	-1
	19	-2	4	2	0	6	7	3	-2	-4	-3	-9	-12	-5	-1	-1	-3	-6	1	5	1
	20	7	10	1	14	7	6	11	6	10	-7	7	14	3	10	10	11	12	7	13	10

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	3	3	1	8	7	1	1	6	9	6	6	9	7	7	6	9	5	4	5	5
	2	7	5	6	7	2	6	7	3	5	5	7	8	7	5	2	2	6	2	2	4
	3	0	2	2	6	6	7	16	5	10	3	-2	3	8	-4	-3	2	6	5	0	6
	4	2	2	11	15	9	11	7	3	12	10	3	15	4	5	7	10	7	9	4	9
	5	0	-2	8	3	5	3	9	-1	10	-1	10	2	4	6	0	10	8	-6	-4	11
	6	4	4	-2	0	3	2	6	6	1	4	1	2	4	1	1	-1	4	3	1	5
	7	2	7	1	3	5	4	4	6	3	6	-1	3	4	4	4	2	9	1	5	3
	8	-1	1	-5	1	-2	3	6	-2	-3	5	-2	8	6	6	2	4	3	4	5	4
	9	4	-1	1	0	5	9	4	14	9	9	7	10	11	7	5	7	5	6	10	0
	10	9	17	7	7	7	4	7	7	6	4	11	2	6	7	6	2	4	14	11	5
Female	11	6	2	6	3	0	4	0	1	4	4	5	3	6	11	1	6	1	1	6	2
	12	5	15	6	11	8	3	20	16	6	6	1	17	9	12	5	16	13	17	18	6
	13	3	10	3	1	-2	12	2	2	3	2	7	8	9	8	8	3	-1	3	0	5
	14	0	3	1	0	2	6	0	2	2	0	-1	-1	-3	2	1	-1	0	3	1	-1
	15	6	1	12	16	10	11	8	8	3	4	10	10	10	5	7	4	12	3	10	10
	16	1	11	5	4	6	4	4	9	5	7	7	8	0	2	5	8	9	3	9	3
	17	-5	5	3	7	4	-5	5	5	4	6	3	5	-3	-2	4	7	-5	-2	-3	0
	18	-3	-3	-1	-4	0	0	2	2	-3	1	-6	2	-1	0	-3	-5	-1	4	-1	-1
	19	-4	4	-4	-1	-1	-1	1	3	-4	4	3	-3	-1	3	-4	-2	-1	-2	4	-4
	20	9	19	6	10	5	10	9	15	7	8	4	7	8	12	8	7	8	9	5	13

GROUP III (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																		
		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	3	7	5	8	4	1	2	0	6	6	8	5	5	5	1	5	7	4	5	4
	2	2	10	5	2	3	5	5	0	5	3	4	6	2	2	3	2	3	4	1	-1
	3	0	1	2	-2	4	-2	0	4	6	1	5	5	-3	0	3	-1	-1	6	6	6
	4	12	14	4	9	0	14	7	5	2	12	5	21	9	10	18	9	6	22	5	-2
	5	8	-2	5	0	6	8	2	7	6	12	13	-5	-5	1	-3	-1	0	5	-1	8
	6	8	8	3	2	2	-2	1	-1	0	3	-5	0	-3	1	2	2	0	-3	-7	3
	7	0	4	1	0	0	1	5	2	6	-1	1	1	1	5	2	2	7	5	2	3
	8	4	-1	-3	1	3	1	1	-2	0	5	3	-4	-2	-2	-4	-1	4	-3	-3	-6
	9	6	3	8	8	2	8	7	9	9	8	3	12	7	3	8	11	1	5	10	11
	10	6	5	6	13	3	6	6	6	1	4	2	0	6	5	7	9	5	6	9	10
Female	11	4	8	4	2	6	16	4	10	8	4	3	2	-6	0	3	-3	3	6	-2	6
	12	12	9	1	4	15	12	0	12	21	11	3	6	13	1	9	9	7	13	18	18
	13	6	1	5	1	6	3	3	1	2	2	4	10	3	5	1	-1	6	4	2	2
	14	1	4	2	-4	2	5	3	1	3	3	2	3	2	1	2	1	5	-2	3	4
	15	8	15	10	8	2	1	13	11	9	10	12	0	8	15	11	11	10	14	10	7
	16	0	8	-1	7	-3	5	1	7	7	1	1	0	3	1	2	0	4	4	-1	-4
	17	1	3	-7	1	2	-3	-3	2	0	0	0	1	-1	1	0	-4	0	2	-10	3
	18	-2	-1	-1	-6	-1	4	-2	-1	-3	-2	-3	0	0	0	5	2	-2	0	-2	-1
	19	-3	3	-2	-3	1	1	7	2	0	-3	2	-5	2	2	-2	2	1	-5	1	0
	20	2	8	10	-4	15	5	6	5	1	4	4	7	14	0	2	6	13	5	8	10

GROUP IV - BLACK HORIZONTAL LINE

MILLIMETRES OF ILLUSION

Subjects

	Trial																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Male 1	7	8	8	8	6	9	8	10	5	2	9	8	4	9	7	9	8	6	7	7
2	6	8	8	3	-4	2	7	5	7	11	0	6	3	4	7	6	6	5	3	6
3	10	5	1	8	7	6	9	6	6	4	7	3	2	2	6	3	6	5	8	6
4	7	7	6	5	6	2	6	8	9	4	6	1	7	7	18	13	7	2	3	1
5	12	18	17	24	11	18	21	10	23	23	15	13	19	12	18	11	24	12	15	8
6	1	5	-1	1	5	2	1	1	4	5	3	-2	-3	3	0	1	-1	2	-1	-1
7	2	0	2	4	7	2	1	3	0	1	1	4	1	3	4	3	5	2	8	4
8	0	1	2	1	-2	-2	-3	0	-5	-5	-4	-3	-4	-7	-3	3	0	0	-3	0
9	6	8	10	8	2	6	5	5	6	9	4	7	9	7	8	4	12	5	11	3
10	6	3	0	3	2	5	5	7	-1	3	-2	4	5	4	4	0	3	4	3	2
Female 11	14	11	7	-1	6	2	13	8	7	8	6	5	4	2	4	13	7	9	8	9
12	11	9	5	9	10	11	8	5	4	2	7	8	3	8	5	6	5	7	8	5
13	4	5	3	9	5	5	11	3	9	2	5	11	10	10	7	6	5	0	6	6
14	7	6	11	6	5	8	8	7	10	9	19	13	11	8	10	9	12	15	18	15
15	5	5	1	0	-2	4	0	3	4	4	5	5	4	5	1	4	2	2	3	3
16	9	4	4	4	3	7	8	7	10	6	5	6	7	9	10	10	6	4	7	9
17	9	6	6	6	5	7	8	5	7	5	10	3	9	4	7	7	4	8	8	0
18	14	7	8	9	9	10	5	8	3	3	5	3	2	6	5	4	14	4	5	4
19	3	4	1	2	0	2	0	3	-2	4	-1	2	-1	3	1	0	3	7	3	2
20	15	8	10	5	5	6	6	4	5	5	1	4	1	5	3	6	6	2	7	5

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Male	1	5	6	8	4	7	5	3	4	3	4	3	7	4	8	5	2	7	6	3	5
	2	5	9	5	0	1	2	0	2	-1	3	1	-1	-1	1	1	1	0	3	0	7
	3	3	4	2	5	5	9	7	4	2	5	3	2	0	5	4	4	7	3	5	4
	4	3	6	7	5	7	-1	6	2	3	0	-4	-3	-1	2	1	8	3	1	4	0
	5	15	18	13	6	10	15	16	20	19	13	15	16	23	22	14	11	21	16	25	13
	6	6	2	-1	3	7	-1	2	2	4	1	1	2	2	3	3	0	-1	4	1	0
	7	5	2	2	2	5	6	6	4	1	2	2	5	6	-1	4	6	8	3	-3	0
	8	1	1	1	2	1	-3	1	-2	0	0	1	-2	-3	-1	-1	-1	1	0	1	-2
	9	7	10	3	9	3	4	7	0	-1	5	1	7	5	8	10	2	5	4	10	5
	10	2	0	3	3	2	3	7	2	3	5	3	10	5	0	4	1	2	0	0	4
Female	11	11	7	6	9	8	4	6	9	3	4	6	6	5	7	3	4	4	8	1	3
	12	7	4	6	4	8	5	9	4	4	1	5	8	5	3	11	7	10	5	5	6
	13	7	5	11	4	8	10	2	7	9	2	4	5	5	2	7	7	10	4	6	4
	14	19	16	22	15	7	6	17	7	4	2	11	12	13	17	11	13	13	19	17	13
	15	3	3	1	2	1	-1	-1	2	5	1	2	2	1	7	0	3	1	1	0	2
	16	0	4	7	13	7	9	9	6	7	6	6	6	9	8	7	7	0	5	6	2
	17	3	4	7	9	10	7	6	7	4	5	7	4	6	5	5	12	6	5	8	7
	18	4	7	5	9	6	8	11	10	6	8	8	9	0	8	6	3	5	8	1	8
	19	-3	3	-5	2	-1	3	-4	-2	-3	1	-4	-2	4	-1	2	-8	-2	4	5	-2
	20	-1	4	3	8	2	11	8	7	3	7	5	10	9	14	15	17	4	6	14	2

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects		Trial																		
		41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Male	1	6	11	7	3	5	4	3	4	5	6	6	3	4	3	6	2	3	5	6	4
	2	7	1	2	4	1	2	4	2	4	1	1	-2	-1	5	5	3	0	3	1	-2
	3	3	4	5	2	1	-3	1	1	4	6	6	5	2	1	3	4	7	7	2	3
	4	0	1	7	2	6	4	-4	2	-4	1	9	7	5	8	4	9	6	7	6	4
	5	15	6	14	6	13	19	20	14	23	13	20	7	17	25	16	8	24	16	21	26
	6	2	-2	-1	3	-2	1	1	-1	0	-1	1	-1	0	0	0	2	3	1	5	1
	7	7	3	4	6	7	8	8	10	5	3	9	6	8	6	6	4	-1	0	7	0
	8	1	-1	0	1	1	2	0	-6	2	4	6	5	5	4	1	2	-1	3	3	2
	9	10	6	2	13	8	3	6	-4	3	9	15	9	8	6	9	12	6	4	7	5
	10	2	0	6	4	6	7	2	4	2	1	3	5	-3	4	2	0	1	2	5	0
Female	11	0	3	6	5	2	4	1	3	2	1	4	2	-1	3	3	3	4	1	4	8
	12	8	3	7	7	12	4	2	6	3	1	6	5	7	4	1	7	1	10	6	6
	13	5	7	7	9	5	9	6	5	3	5	-2	8	3	5	4	6	2	4	5	5
	14	13	15	14	10	15	11	11	8	16	9	12	12	7	9	10	4	8	2	10	15
	15	0	1	-1	4	3	-1	-1	0	3	-1	-2	-3	0	-1	1	-2	-3	3	0	-2
	16	9	6	12	7	6	7	8	11	11	11	12	9	7	4	6	2	5	9	8	6
	17	15	10	9	8	10	6	9	9	6	11	8	7	9	2	6	9	7	10	10	7
	18	8	8	10	6	2	3	5	3	7	5	7	10	6	6	6	10	3	9	9	10
	19	3	-1	4	-7	10	5	-4	-3	5	10	22	-6	1	-5	2	5	0	0	2	-5
	20	3	1	8	4	3	3	5	3	1	5	3	4	3	15	14	18	15	10	24	15

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trial

		61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Male	1	5	5	-2	6	3	3	5	3	2	5	2	4	4	1	8	7	3	5	5	3
	2	0	-1	-1	1	0	1	-1	-2	1	-3	-4	3	-2	-2	1	-2	-7	-2	-1	-1
	3	1	4	7	7	0	3	8	8	3	5	4	9	2	2	1	4	2	5	4	6
	4	7	5	3	7	-1	1	5	6	6	7	4	-1	2	4	6	7	1	3	9	1
	5	11	8	8	15	23	21	8	21	11	18	22	24	16	21	16	17	9	13	18	8
	6	0	2	3	5	4	-1	-1	-6	-2	0	1	-2	-4	-1	1	-3	-2	-2	-2	-2
	7	0	5	3	9	8	4	10	10	6	5	0	1	3	0	0	0	5	5	-1	9
	8	6	4	-1	3	2	2	3	5	6	5	3	5	6	-1	2	3	-1	2	1	2
	9	8	11	8	-1	6	5	2	6	2	9	13	11	6	8	11	6	2	-1	4	-2
	10	-1	2	5	2	2	0	2	6	-5	-1	2	0	3	0	2	-1	2	5	1	4
Female	11	-6	3	7	3	2	5	0	9	4	-1	1	4	2	-1	6	6	6	9	4	0
	12	0	6	5	8	7	4	6	3	11	-1	2	11	9	3	5	11	12	1	6	5
	13	8	8	6	2	6	7	2	8	7	11	9	8	6	5	2	11	7	6	4	3
	14	11	13	13	16	18	11	9	7	8	8	16	13	13	14	14	18	19	18	14	17
	15	2	4	3	2	3	0	4	1	3	4	4	-1	7	0	-1	1	1	-5	1	1
	16	8	3	4	5	6	6	2	5	4	5	5	-1	5	3	0	8	5	3	3	3
	17	9	7	5	9	4	9	9	7	6	6	5	7	5	3	7	6	3	9	7	10
	18	8	8	2	6	7	1	8	11	6	5	0	0	5	11	6	3	2	5	8	2
	19	7	6	1	11	-11	-10	-2	9	0	2	-5	1	0	-1	-3	4	-1	1	-3	1
	20	11	14	2	6	5	6	6	5	5	5	4	7	0	9	7	7	6	4	0	13

GROUP IV (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trial

		81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Male	1	3	3	6	4	6	1	6	4	-1	4	2	6	2	1	0	3	3	4	3	3
	2	-3	-1	-5	4	-2	1	1	1	0	0	-3	-2	-1	2	-1	4	2	0	-3	-3
	3	5	1	9	5	3	3	6	5	4	7	3	5	2	5	8	4	4	3	9	2
	4	5	3	7	2	3	1	5	5	2	1	4	1	1	4	3	2	3	3	3	4
	5	23	12	15	11	19	12	7	10	11	4	22	11	12	16	17	7	14	18	20	15
	6	-6	0	1	0	-4	-1	1	2	3	-1	-1	7	-5	-4	-1	-1	-2	-1	4	3
	7	13	-4	1	6	-1	-3	0	4	8	7	6	2	3	3	1	3	2	6	7	0
	8	0	0	1	3	0	-2	-1	0	1	1	3	0	1	2	1	1	3	3	-1	-1
	9	12	17	8	12	6	12	16	15	14	11	3	-3	5	6	7	17	3	6	6	1
	10	7	2	-1	3	3	5	7	10	7	2	4	5	4	3	0	3	-1	4	5	2
Female	11	-7	0	1	2	3	2	0	-5	-2	8	6	6	1	2	0	2	6	-2	-1	-5
	12	9	9	11	9	5	6	7	6	4	4	11	9	10	12	2	5	7	20	16	12
	13	7	5	6	8	5	10	8	3	1	8	6	4	8	0	7	3	6	2	5	5
	14	17	16	19	20	15	16	11	18	16	15	14	10	16	15	14	15	19	20	15	8
	15	1	3	-3	5	-4	1	2	2	1	6	4	2	0	-1	1	0	0	-2	3	3
	16	6	7	6	8	4	2	4	0	1	9	2	7	4	6	4	5	5	5	1	6
	17	12	9	5	10	10	6	10	7	10	11	5	14	5	4	4	6	3	5	6	5
	18	6	6	7	10	6	8	1	8	11	5	5	6	4	6	4	1	5	8	6	0
	19	0	0	4	2	0	2	4	-1	4	1	0	2	-2	-5	-3	11	1	-5	-1	1
	20	3	9	8	4	4	6	6	8	10	0	11	4	3	3	11	4	-4	1	4	-2

APPENDIX E

RAW DATA FOR EXPERIMENT 5

GROUP I - TRAINING TRIALS (60 - DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

Trials

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	17	16	17	16	16	16	14	14	15	14	8	10	10	10	11	7	6	7	7	14	8	9	6	9	9
	2	11	6	5	6	7	9	7	8	5	6	4	9	6	5	9	8	8	6	6	5	7	7	8	7	12
	3	19	16	15	16	13	16	12	17	14	15	12	17	23	19	13	15	13	16	12	15	13	12	14	15	19
	4	16	12	17	14	16	11	15	18	17	15	20	25	14	10	8	17	13	15	15	14	11	16	13	15	12
	5	11	7	12	5	11	7	11	10	6	4	3	2	1	-4	-1	-4	-2	-5	-1	-3	-1	1	-2	0	2
	6	13	11	11	13	11	11	11	10	13	13	12	9	10	6	7	6	6	4	12	9	5	5	10	8	7
	7	11	11	9	8	11	7	11	15	9	10	11	11	15	11	7	14	8	9	7	9	7	11	6	10	11
Female	8	10	9	14	11	11	13	14	11	10	14	16	11	12	13	11	13	12	10	12	8	12	15	12	13	13
	9	6	9	9	9	12	11	18	14	12	12	13	12	14	9	9	11	12	16	17	16	10	9	14	14	18
	10	10	13	8	3	7	9	10	11	8	10	6	7	9	11	13	10	11	11	7	9	7	7	10	11	14
	11	7	11	9	6	7	4	8	8	6	8	6	7	12	9	7	9	9	7	9	11	7	9	9	9	6
	12	14	13	11	15	13	10	13	10	15	13	10	10	11	10	15	14	14	12	9	8	11	9	9	6	8
	13	14	12	5	6	5	4	6	8	9	10	7	5	5	2	6	3	10	5	9	5	9	4	5	4	1
	14	15	15	13	18	9	11	21	15	17	20	14	13	12	17	15	18	14	12	16	13	15	18	17	19	18

GROUP I - TRAINING TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trials

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	12	6	6	9	6	7	5	4	5	3	4	2	7	8	12	2	10	3	6	7	0	4	4	13	3
	2	5	6	7	8	5	4	8	7	4	6	5	12	5	8	11	3	3	3	8	7	6	5	3	1	5
	3	19	13	13	18	14	18	11	16	15	11	13	13	15	13	15	13	12	17	16	13	12	13	15	15	12
	4	14	23	11	14	14	13	11	14	12	11	12	19	14	9	14	10	16	17	7	14	11	12	9	8	8
	5	1	4	1	-1	0	2	0	1	0	-1	-1	3	-4	-2	1	0	1	1	-2	3	-3	-4	-3	4	0
	6	9	5	9	9	10	7	7	10	6	11	10	10	8	11	10	10	10	7	10	10	6	10	8	10	11
	7	11	8	12	7	9	8	5	13	6	10	6	12	5	8	7	12	5	3	12	8	5	9	4	2	4
Female	8	14	14	9	11	10	10	3	10	7	6	7	9	8	5	10	9	7	5	7	2	13	8	7	5	3
	9	12	11	7	6	13	4	12	8	6	9	7	12	8	7	8	10	3	4	9	5	6	8	5	11	9
	10	4	6	8	9	10	6	5	9	11	13	8	6	4	6	5	9	4	4	0	5	6	0	4	3	0
	11	10	10	16	11	8	5	14	7	13	15	14	7	9	13	14	9	12	5	14	13	9	13	9	16	11
	12	6	4	6	3	6	5	7	7	6	6	4		8	11	2	4	5	5	8	8	8	7	7	9	6
	13	8	-2	2	6	3	0	-1	2	2	-1	-9	-2	0	1	3	0	3	-2	1	3	1	4	7	8	9
	14	19	17	19	20	19	14	16	15	17	15	14	16	18	22	13	16	21	20	20	15	14	14	11	16	15

GROUP I - TRANSFER TRIALS (60-DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

Trials

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	16	9	1	8	8	6	2	0	4	8	8	9	8	3	12	9	11	5	6	5	4	8	8	2	0
	2	5	8	5	9	7	6	5	8	5	1	6	5	6	2	7	5	7	9	5	8	8	5	10	5	5
	3	14	12	18	18	16	15	12	15	15	10	15	12	14	10	13	14	14	15	13	11	12	12	13	16	12
	4	18	17	18	13	10	9	11	10	8	12	10	10	10	10	13	9	9	11	9	11	11	14	13	15	15
	5	3	2	2	5	-1	2	2	5	3	1	0	-1	1	3	-1	1	-3	-2	-4	0	-1	-2	-4	-1	-5
	6	18	9	9	15	12	8	10	18	8	8	11	5	11	10	9	10	7	9	10	11	3	13	11	10	5
	7	8	6	4	7	3	7	3	2	3	10	14	7	5	-1	4	0	-1	6	0	8	10	-3	0	4	1
Female	8	7	5	10	4	6	5	4	1	7	9	2	3	5	3	3	2	7	1	4	-1	-2	5	1	-2	1
	9	12	4	10	8	11	9	10	10	3	4	1	11	10	7	10	9	9	12	12	12	11	12	9	13	10
	10	0	5	1	6	8	6	6	7	4	1	8	10	5	2	1	1	6	9	0	1	0	2	5	0	5
	11	7	11	11	6	6	12	11	16	9	3	4	6	13	12	9	8	5	4	8	5	6	18	11	4	6
	12	9	9	8	8	4	5	9	2	6	6	4	0	-1	11	1	2	6	2	7	2	0	5	5	12	7
	13	9	3	4	3	0	2	3	-2	-2	-4	1	8	6	-4	6	1	-1	10	9	5	9	4	6	1	-4
	14	15	14	17	11	11	15	14	13	12	20	8	14	12	22	16	19	12	16	11	15	16	15	13	19	19

GROUP I - TRANSFER TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trials

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	2	5	1	4	3	3	11	8	2	7	3	4	6	0	3	7	13	8	7	2	7	0	6	13	9
	2	5	11	6	7	7	9	7	2	8	5	6	7	6	7	4	4	9	11	5	11	9	4	5	6	8
	3	11	13	9	15	19	12	13	10	15	12	14	10	11	14	7	16	11	8	15	15	17	12	13	24	9
	4	16	12	14	18	11	13	13	10	9	15	10	13	8	9	10	16	14	8	8	11	11	12	10	14	15
	5	1	-1	0	-1	-1	1	-3	2	0	-4	-5	-4	3	-2	-4	-3	-2	-2	-4	1	1	-1	1	-1	0
	6	9	9	12	8	14	8	6	13	8	12	9	11	7	13	8	7	10	3	7	2	10	14	8	11	10
	7	7	2	4	5	-3	5	-1	6	3	2	2	5	6	8	2	10	3	10	1	1	8	-1	9	1	7
Female	8	-1	3	-4	-1	-1	1	0	-1	-2	-1	2	-4	1	-2	-1	-4	4	1	0	0	4	-2	3	-1	-3
	9	15	11	10	4	17	12	9	6	5	10	12	13	11	6	12	9	1	-1	9	-2	9	9	4	11	2
	10	2	1	4	1	4	-1	1	2	3	4	8	3	7	4	5	10	4	3	3	3	3	2	1	3	8
	11	4	9	17	18	15	12	6	9	8	12	16	7	9	11	11	12	12	8	15	9	17	14	2	11	1
	12	-4	3	-4	1	2	1	-1	2	1	3	-1	-2	-5	-1	-2	5	-1	-3	-1	-4	-3	-7	11	-2	5
	13	9	4	4	-6	-1	3	2	-2	2	0	10	9	5	7	8	4	-4	1	8	4	4	0	-4	0	7
	14	17	12	14	15	16	15	14	20	19	13	15	17	25	15	16	15	23	17	18	11	21	15	22	17	12

GROUP II - TRAINING TRIALS (60-DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

Trials

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	6	6	8	7	8	9	11	7	9	6	9	8	8	6	6	3	7	3	5	7	5	4	4	10	4
	2	18	13	14	14	11	12	14	15	13	19	18	18	16	15	12	14	16	16	19	15	16	17	11	11	15
	3	11	6	10	8	8	6	9	9	7	7	5	4	3	3	4	8	7	5	10	2	7	6	3	8	6
	4	20	10	11	11	10	13	9	12	14	14	9	9	10	6	7	9	5	10	9	8	11	1	7	3	9
	5	19	18	12	15	11	12	10	10	8	8	6	15	10	8	5	10	10	14	15	9	3	7	11	1	10
	6	16	16	16	15	16	19	13	21	14	22	11	11	15	16	8	18	9	7	8	14	17	12	15	5	20
	7	12	11	11	12	9	10	15	14	10	9	8	11	9	13	12	10	15	12	13	14	11	10	12	12	9
Female	8	21	11	11	16	10	16	8	12	12	9	12	14	12	14	14	13	10	9	7	13	9	12	9	10	7
	9	16	19	15	15	13	17	13	16	19	17	17	21	23	21	16	9	13	12	15	8	10	14	16	16	25
	10	13	12	12	18	10	15	18	18	17	15	15	16	13	12	12	15	14	9	13	15	15	16	15	17	20
	11	18	13	16	15	14	12	12	20	16	18	15	18	17	14	19	18	17	18	19	21	14	15	16	22	14
	12	14	10	11	10	10	11	9	10	10	10	9	4	8	8	14	12	11	5	9	10	10	11	8	10	7
	13	13	11	12	6	11	11	13	6	11	10	4	13	12	9	12	10	8	5	14	8	6	4	9	12	9
	14	12	10	7	9	11	8	5	8	9	7	6	10	5	6	7	8	8	6	11	10	4	4	7	-2	8

GROUP II - TRAINING TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trials

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	6	7	7	4	5	3	5	2	5	0	4	2	3	3	4	2	5	4	3	2	6	2	5	3	4
	2	13	16	17	12	17	20	13	13	11	4	8	4	4	5	9	8	8	6	8	11	14	12	13	18	15
	3	3	9	9	6	9	11	5	7	3	2	7	1	2	-1	3	-1	3	2	-3	-3	-6	2	-2	1	-4
	4	7	13	10	9	1	12	4	11	5	12	9	2	5	7	14	-4	20	17	13	4	9	4	10	2	10
	5	8	10	16	11	6	6	3	5	8	8	4	6	8	8	2	4	4	9	6	11	8	9	4	5	8
	6	10	11	15	8	10	16	18	7	7	15	20	21	13	20	8	15	5	14	7	9	17	22	10	8	15
	7	16	14	11	15	13	14	12	13	12	15	10	13	13	15	15	12	15	10	15	8	12	14	14	9	10
Female	8	5	13	8	5	5	6	10	7	8	6	3	11	4	7	8	9	9	0	6	7	10	6	13	10	12
	9	22	20	24	23	17	20	21	21	19	19	17	19	24	23	13	14	15	22	18	19	14	15	14	15	15
	10	13	12	10	12	11	17	10	11	15	15	14	13	13	13	15	18	16	16	15	13	13	10	12	11	14
	11	17	10	8	21	13	13	15	20	8	6	11	13	17	11	10	-1	0	4	-3	8	6	-4	21	8	6
	12	11	11	9	12	12	11	12	9	10	10	9	9	10	8	9	13	9	8	10	10	10	11	13	4	7
	13	16	11	10	13	9	12	9	15	13	6	10	6	13	14	9	6	15	12	9	16	8	11	8	9	8
	14	4	0	4	1	0	0	-6	-2	-2	2	1	6	1	-1	3	2	4	0	1	-4	4	8	3	6	-3

GROUP II - TRANSFER TRIALS - (120-DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	5	5	0	5	7	3	7	7	11	3	1	4	4	4	3	5	3	-2	3	1	2	2	10	3	3
	2	15	11	15	9	10	12	10	10	12	7	11	12	11	11	8	6	13	14	9	13	13	12	10	7	13
	3	5	0	0	5	2	1	-1	0	0	-1	3	4	0	3	5	0	1	0	1	-1	4	-1	-3	2	-1
	4	6	4	1	0	6	4	4	5	3	-2	-2	9	10	2	1	6	7	17	8	6	0	-1	-1	-5	4
	5	5	2	11	7	10	9	0	0	-2	2	-1	3	-2	9	5	1	1	-1	-2	-5	0	0	-8	-2	-5
	6	13	4	12	6	4	2	8	6	11	5	11	7	5	6	5	9	5	5	3	3	13	13	4	9	13
	7	3	4	2	6	3	3	6	5	7	5	6	8	7	5	6	7	6	9	7	3	8	4	4	4	4
Female	8	1	6	2	6	5	6	11	6	7	6	3	6	3	2	-1	3	0	7	6	1	1	3	3	6	0
	9	9	12	4	6	5	4	8	6	9	17	4	7	7	11	7	8	4	3	7	3	14	7	14	15	4
	10	7	13	8	9	11	9	13	8	10	13	12	10	12	10	10	9	9	8	10	8	8	8	10	11	13
	11	8	13	2	4	-1	-2	0	16	12	11	12	7	9	0	9	10	7	8	11	7	8	0	-2	12	1
	12	4	7	7	6	5	8	10	8	6	1	13	3	3	8	4	5	6	5	4	8	4	10	6	7	7
	13	7	7	2	1	1	0	6	3	5	9	7	4	6	4	9	9	7	5	8	8	5	3	10	6	3
	14	-1	-4	7	1	3	4	-2	11	7	-2	5	0	7	4	4	4	4	5	2	2	1	6	2	0	2

GROUP II - TRANSFER TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trial

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	7	5	3	3	7	2	7	2	6	6	4	3	4	1	6	0	3	2	1	3	4	5	1	-2	-2
	2	7	6	7	10	13	8	7	5	2	5	6	4	4	1	3	7	5	2	1	2	5	4	7	7	2
	3	-1	-3	3	-4	1	1	-4	1	-4	-6	-2	-2	0	-3	-5	-1	-5	-4	-4	-1	-3	0	-3	-2	-5
	4	-2	3	9	3	1	-1	6	-1	12	20	19	11	26	2	4	0	6	23	-1	3	-6	5	9	2	8
	5	-1	2	1	3	-3	-2	2	5	-4	-2	-1	-1	1	-3	-4	0	-1	1	-2	1	0	-2	1	1	-3
	6	3	1	6	6	7	11	9	6	11	3	12	11	6	13	11	6	6	9	3	13	5	10	14	2	5
	7	3	9	6	7	6	5	1	3	3	4	5	5	0	5	5	2	2	3	2	-1	4	2	2	0	-1
Female	8	0	5	6	3	1	7	4	3	3	2	2	5	2	6	2	5	3	9	11	1	-7	9	7	0	4
	9	6	9	12	1	1	21	7	12	6	7	8	6	4	2	15	6	10	9	-2	1	8	4	7	0	11
	10	11	10	12	4	11	11	7	10	11	12	6	12	10	13	7	10	6	13	11	11	11	10	9	11	10
	11	8	10	2	9	7	-7	11	18	10	9	17	10	8	5	10	3	7	7	5	2	4	2	9	8	12
	12	6	7	3	6	8	8	6	7	1	7	4	6	4	6	7	6	5	1	5	2	7	5	4	4	7
	13	8	6	4	6	5	4	11	1	8	13	6	6	6	3	7	10	9	4	4	9	11	6	8	7	10
	14	2	9	7	5	4	0	1	-2	-3	0	-3	-1	0	4	4	-5	1	-2	0	2	-1	1	1	-1	1

GROUP III - TRAINING TRIALS (120-DEGREE FIGURE)

MILLIMETRES OF ILLUSION

	Subjects	Trial																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	7	8	5	12	4	10	10	13	10	7	4	8	11	8	10	8	7	7	9	10	12	7	13	12	10
	2	8	5	2	9	5	6	3	8	8	6	7	5	6	5	5	6	4	8	2	2	2	0	3	5	4
	3	4	10	4	7	4	7	5	3	4	5	8	4	8	4	5	5	5	6	5	3	6	6	10	7	10
	4	14	14	14	14	14	12	16	16	10	17	17	10	15	15	10	12	15	15	14	14	14	16	18	6	11
	5	12	9	12	10	8	7	6	8	2	4	6	4	9	6	6	7	3	3	2	5	8	3	7	4	2
	6	11	12	11	11	14	14	10	9	14	11	10	6	10	5	9	10	12	10	10	7	9	6	11	16	9
	7	12	7	10	14	9	6	4	9	4	5	2	11	4	5	10	9	6	9	10	3	2	3	9	14	11
Female	8	9	9	7	7	10	9	10	9	9	10	8	4	10	9	4	10	7	7	5	11	9	5	12	4	6
	9	11	12	3	8	-2	5	-1	3	13	8	11	16	13	8	22	17	5	8	13	11	19	7	14	21	17
	10	3	16	1	12	15	13	11	9	10	7	17	13	7	7	13	11	13	16	17	21	9	15	10	12	14
	11	15	17	11	14	12	13	15	11	18	11	9	14	5	11	14	9	11	8	8	9	11	7	9	10	12
	12	2	4	9	5	10	8	2	1	1	2	5	0	2	4	9	5	4	4	14	3	8	8	9	11	8
	13	6	3	5	5	3	-4	2	7	12	10	12	9	13	13	10	10	7	11	8	5	3	13	14	10	11
	14	12	6	7	17	11	14	10	6	13	13	13	6	9	4	11	7	9	7	19	3	5	15	5	6	3

GROUP III - TRAINING TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

		Trial																							
		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	11	7	10	11	8	10	11	12	7	8	11	8	10	11	7	9	9	11	9	8	4	13	12	12	7
	2	2	3	2	4	1	-1	2	1	-2	7	1	0	3	-2	3	3	2	1	1	8	-2	0	-3	0	3
	3	6	6	5	4	5	3	7	10	7	7	4	5	8	7	6	6	0	3	7	2	2	7	12	8	7
	4	19	12	10	16	17	9	13	9	14	11	14	13	12	18	11	9	14	14	11	12	11	11	15	15	16
	5	5	4	6	3	3	3	5	7	4	5	6	3	1	2	3	3	6	5	5	4	4	0	2	5	4
	6	6	9	12	2	7	2	6	8	3	9	9	5	13	12	7	9	7	7	8	11	12	6	6	12	8
	7	7	5	5	2	11	8	7	6	10	11	4	11	10	7	9	8	6	9	4	5	8	7	10	8	9
Female	8	12	9	11	12	10	13	10	9	12	12	11	6	10	9	9	7	8	8	9	8	4	6	5	4	11
	9	12	13	20	14	22	20	20	15	19	11	6	13	23	18	19	21	20	10	25	29	17	13	15	7	15
	10	10	13	21	18	13	9	11	12	12	14	9	16	12	11	13	8	12	10	11	11	12	10	12	12	11
	11	10	9	13	12	4	11	5	13	15	5	6	14	8	11	12	15	10	12	13	11	7	12	9	10	10
	12	5	6	8	7	3	11	5	6	14	10	5	4	3	4	11	1	12	6	17	16	11	10	7	3	14
	13	7	6	1	12	10	8	9	12	11	6	5	0	-1	3	8	6	0	6	8	7	1	8	8	5	5
	14	2	5	-1	8	7	2	3	8	5	4	10	5	4	9	9	4	4	8	8	6	8	12	6	6	2

GROUP III - TRANSFER TRIALS (120 - DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

Trial

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	9	10	9	8	10	8	11	12	6	13	12	12	11	10	11	12	10	10	10	14	19	10	11	15	12
	2	1	3	0	0	1	-1	2	-1	7	0	1	1	2	-1	-2	1	-1	3	4	-3	1	0	-2	7	0
	3	7	4	6	3	3	7	3	4	6	3	3	5	6	4	3	4	5	8	2	4	2	2	5	4	7
	4	11	7	13	8	18	14	12	11	9	15	8	8	13	10	18	11	14	15	10	13	10	7	14	13	14
	5	-1	5	5	-1	5	4	3	3	3	6	2	5	0	4	4	5	2	6	6	6	4	1	4	6	2
	6	9	13	9	2	14	5	10	4	12	8	12	10	12	3	5	6	6	13	6	2	8	6	10	14	11
	7	6	3	6	1	6	1	9	2	5	6	1	5	3	3	10	7	10	9	0	8	7	9	6	9	9
Female	8	10	12	6	7	3	6	5	9	10	13	8	3	10	10	8	6	6	12	15	7	9	10	7	7	9
	9	9	13	6	11	15	15	9	16	12	12	18	20	12	12	12	13	13	19	19	14	11	24	11	18	23
	10	16	14	10	17	9	20	13	5	10	15	12	15	10	9	10	15	17	12	10	8	10	11	8	11	18
	11	7	17	9	9	11	7	11	10	3	12	13	6	5	9	7	5	11	8	10	6	9	11	6	9	9
	12	4	6	5	6	0	-1	6	6	0	11	4	7	4	10	4	5	3	2	9	11	12	12	0	9	7
	13	-3	2	4	4	5	8	1	7	3	1	8	6	4	1	6	1	5	10	-1	1	6	2	-1	5	5
	14	5	7	4	11	7	8	10	3	4	15	8	8	3	13	6	5	4	11	8	9	8	9	9	7	9

GROUP III - TRANSFER TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

Trial

		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	9	10	7	10	11	12	4	9	6	9	7	14	9	12	11	13	8	9	11	8	15	14	17	7	15
	2	5	8	3	1	1	-1	5	3	-7	2	-1	1	-1	0	-4	4	0	-3	-1	2	6	3	1	1	1
	3	4	4	4	10	2	7	4	8	6	0	5	5	5	5	3	6	6	2	4	3	3	1	5	-2	6
	4	11	12	14	14	11	16	9	14	11	13	14	15	13	16	13	11	14	14	14	6	16	15	13	14	13
	5	5	1	3	3	5	6	3	2	3	5	6	5	2	7	6	6	4	6	2	4	-1	4	4	0	8
	6	5	8	11	6	6	9	4	6	10	5	12	4	7	4	6	8	13	8	3	11	11	8	6	8	11
	7	11	6	4	14	10	8	8	10	10	11	3	10	13	11	8	12	4	9	7	8	8	7	9	5	5
Female	8	8	10	12	10	9	10	10	4	10	7	10	8	6	5	8	7	5	5	5	10	5	5	5	5	8
	9	20	17	6	18	9	8	13	11	5	9	7	16	12	10	12	21	14	11	12	25	16	20	3	9	15
	10	10	9	9	12	6	5	8	8	13	2	9	15	16	6	20	20	18	11	16	9	0	11	7	9	12
	11	14	6	12	8	9	4	14	11	19	3	11	0	12	10	9	13	14	10	10	16	13	13	14	4	12
	12	4	8	2	8	8	5	13	1	5	15	3	15	4	18	8	-1	13	11	17	5	6	2	15	4	4
	13	2	6	10	6	6	0	5	8	3	6	5	12	5	13	8	11	3	7	9	6	6	12	10	6	5
	14	9	15	13	7	8	8	8	3	4	2	1	0	1	4	4	5	3	4	5	-3	4	4	2	0	1

GROUP IV - TRAINING TRIALS (120 ± DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

		Trial																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	10	8	3	8	9	12	6	6	11	10	9	9	11	7	6	10	10	10	10	8	11	16	10	9	6
	2	5	12	11	11	13	8	12	8	9	9	12	14	10	7	5	10	10	9	10	11	12	12	6	6	10
	3	4	1	5	4	3	10	9	7	10	8	6	6	9	10	6	5	7	7	11	10	8	7	2	8	7
	4	-2	4	-1	8	2	9	2	13	16	19	9	0	8	-9	7	14	9	6	8	7	10	8	8	9	10
	5	9	7	13	12	10	13	12	14	15	10	14	16	14	9	15	9	12	9	12	13	11	13	12	12	10
	6	10	12	5	2	5	7	10	10	8	7	1	6	7	7	11	7	4	8	9	4	8	8	3	6	5
	7	10	9	2	6	9	2	9	7	5	5	8	8	8	8	12	10	8	6	1	5	7	6	6	6	7
Female	8	5	7	5	7	11	6	6	9	8	8	10	9	6	10	9	8	2	8	10	5	13	8	7	5	7
	9	8	5	2	-2	6	1	3	1	-3	8	10	4	2	4	6	6	3	8	1	0	8	4	8	7	4
	10	11	13	15	14	12	10	13	16	13	11	8	12	15	9	10	10	9	13	13	13	13	16	15	11	13
	11	11	11	14	6	10	14	6	15	7	8	7	5	2	2	4	7	11	8	9	3	5	7	0	9	-1
	12	6	6	11	7	5	9	3	6	4	12	5	9	5	9	6	14	11	14	6	13	12	10	10	10	11
	13	11	10	11	6	9	8	1	1	11	7	12	12	15	9	5	5	7	11	9	7	8	11	9	8	9
	14	11	10	7	9	13	8	5	8	7	6	9	9	5	10	9	13	9	8	13	0	8	13	12	9	4

GROUP IV - TRAINING TRIALS (Continued)

MILLIMETRES OF ILLUSION

Subjects

	Trial																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male 1	11	10	13	10	12	13	10	10	10	8	10	11	10	8	10	10	14	12	9	8	11	6	6	8	5
2	-1	6	4	7	7	11	7	9	10	12	10	10	8	10	7	8	8	8	2	8	6	5	13	7	7
3	8	7	8	6	9	8	8	4	7	7	11	6	6	7	10	7	3	5	7	6	5	6	6	10	7
4	8	11	13	7	5	15	8	5	-1	-6	-3	8	0	3	9	2	3	9	9	4	2	9	7	6	6
5	10	7	13	4	10	6	11	8	13	8	7	4	4	7	3	3	8	3	5	4	4	-1	6	7	5
6	5	7	5	3	4	4	5	4	4	6	3	3	5	7	1	8	5	2	4	5	7	6	10	5	6
7	6	5	8	11	9	10	15	16	11	7	10	11	7	7	12	14	11	17	15	17	11	19	16	15	11
Female 8	11	4	10	9	6	11	12	8	5	7	9	8	12	7	9	4	8	2	6	8	3	9	1	5	6
9	8	3	1	3	3	4	4	5	11	7	7	7	2	2	5	5	7	6	5	5	4	4	10	8	6
10	13	11	17	11	12	13	10	12	14	12	8	11	15	9	13	14	15	11	12	16	4	16	13	16	10
11	6	11	11	11	1	19	-3	5	8	0	5	7	3	2	10	2	10	5	3	7	9	7	1	11	0
12	14	14	10	10	15	6	11	13	13	8	12	18	9	10	15	13	8	13	7	4	16	9	5	10	11
13	13	6	3	5	7	7	7	-5	2	2	2	0	0	9	2	10	5	5	4	4	4	4	5	1	2
14	10	18	5	8	5	14	2	9	6	4	7	10	10	7	11	12	8	15	5	11	3	10	10	9	9

GROUP IV - TRANSFER TRIALS (60-DEGREE FIGURE)

MILLIMETRES OF ILLUSION

Subjects

		Trial																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Male	1	17	12	12	15	15	17	17	20	12	11	11	10	16	10	9	12	14	11	10	9	0	0	3	-3	-6
	2	18	8	11	8	12	10	7	16	6	7	11	5	12	15	11	9	17	11	15	19	10	21	9	15	18
	3	13	12	8	4	4	3	7	4	1	5	6	2	3	7	1	4	4	4	7	3	0	4	6	4	2
	4	6	6	11	16	7	13	9	14	14	11	17	18	26	13	9	12	15	14	16	16	18	15	9	7	14
	5	8	9	4	3	9	5	11	7	11	7	6	4	7	7	3	7	7	9	7	5	8	6	9	8	10
	6	7	5	1	4	1	4	3	2	3	1	7	-2	-2	-3	0	0	4	4	2	13	2	0	3	6	1
	7	11	9	15	18	12	14	12	19	11	16	16	15	14	19	17	14	14	17	17	17	20	16	17	19	22
Female	8	5	2	10	8	3	8	8	7	12	16	5	8	8	14	16	17	8	10	15	16	14	8	6	13	8
	9	10	18	5	9	8	6	9	9	4	7	5	11	7	13	12	8	7	12	11	7	15	7	11	3	8
	10	14	18	9	15	15	10	16	10	10	17	17	21	16	12	16	15	21	11	6	11	12	11	13	17	14
	11	12	12	10	13	12	6	14	14	12	15	13	9	-1	13	14	13	15	13	10	14	14	16	18	16	11
	12	12	8	15	16	11	14	7	17	14	7	14	10	11	15	20	14	7	11	3	15	14	11	12	14	19
	13	-3	2	5	7	3	-1	0	-1	-1	0	0	0	4	-2	-3	-4	-1	-4	-5	-4	-4	-4	1	5	0
	14	6	11	9	1	10	2	11	4	10	2	3	6	6	11	5	12	11	11	10	7	18	4	4	0	7

GROUP IV - TRANSFER TRIALS (Continued)

MILLIMETRES OF ILLUSION

	Subjects	Trial																							
		26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
Male	1	0	-7	-5	4	7	-6	-9	-4	5	-1	2	0	5	-2	0	4	3	4	6	6	4	4	8	12	11
	2	23	14	14	17	17	20	14	15	18	10	11	14	16	15	15	13	6	9	12	16	11	9	12	15	18
	3	6	5	5	1	2	4	3	5	3	3	1	1	-4	0	0	1	5	2	4	1	3	-1	7	0	0
	4	12	14	11	12	9	12	14	8	13	10	12	10	9	10	10	8	6	11	13	16	13	10	9	11	7
	5	10	11	8	15	5	4	5	3	9	8	8	7	3	10	14	2	3	4	8	2	4	2	8	1	5
	6	1	7	5	4	1	7	3	7	8	5	6	2	4	5	5	7	5	7	3	7	0	6	1	12	1
	7	16	14	20	21	16	13	19	15	19	14	16	6	17	18	23	14	20	19	16	18	19	18	22	13	19
Female	8	14	22	6	6	6	15	11	9	14	11	15	15	6	12	12	8	6	5	5	7	8	4	9	4	7
	9	5	8	7	9	11	11	12	6	7	7	5	11	9	11	6	4	11	7	7	8	8	8	6	15	12
	10	7	3	8	7	5	6	15	7	3	2	6	7	3	11	4	7	8	7	5	11	3	1	3	2	5
	11	7	7	6	6	9	2	5	6	7	12	19	5	24	5	9	9	21	5	9	22	2	-4	16	8	10
	12	11	10	19	15	16	10	13	23	15	13	19	16	17	14	14	17	16	12	12	14	14	15	14	6	7
	13	-2	-2	1	5	0	3	-3	-6	0	1	1	-1	-4	-2	-6	-4	-6	1	-3	-1	-1	1	2	-2	-5
	14	4	9	2	6	11	6	5	1	12	5	9	5	4	7	7	5	5	-2	6	11	7	7	7	8	9