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THE RELATIONSHIP OF CONCEPT AVAILABILITY

TO CONTRAST EFFECTS IN JUDGMENT

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THE RELATIONSHIP OF CONCEPT AVAILABILITY TO CONTRAST EFFECTS IN JUDGMENT

CHAPTER I

INTRODUCTION

Contrast effects have been reported in the judgments of a wide variety of stimuli, ranging from judgments of such simple stimuli as auditory intensities (Needham, 1935) and odors (Beebe-Center, 1929) to judgments of complex verbal stimuli such as attitude scale items (Hovland & Sherif, 1952), clinical test responses (Campbell, Hunt, & Lewis, 1957), and propaganda (Hovland, Harvey, & Sherif, 1957).

The major concern of the present study was whether contrast effects such as those typically found in simple judgments in psychophysics are inevitable artifacts of the specific experimental procedures traditionally used, or whether they are more general phenomena which can be produced by different conditions as well. Also, there was cause to suspect that the magnitude of the displacement in judgment which occurs in contrast might be increased if the conditions under which judgment is typically made were less restrictive. The major premise of the present study was that the magnitude of displacement which occurs in contrast is a function of the location of and the availability of conceptual categories which may be used in judgment.

Contrast effects in judgment. Some of the earliest contributions to the study of contrast effects came from the field of esthetics under the label affective contrast (Bacon, Rood, & Washburn, 1914) and, later, under the label hedonic contrast (Beebe-Center, 1932). In 1914 Bacon, Rood, and Washburn described affective contrast in this way:

> The pleasure of an agreeable experience is heightened, if it is preceded by a disagreeable experience, and an impression in itself unpleasant may be felt as pleasant if a more unpleasant state has been its antecedent. In like manner unpleasantness may be heightened or even created through contrast with a preceding agreeable affective state (Bacon, Rood, & Washburn, 1914, p. 290).

The effects of the introduction of relatively extreme stimuli into a previously judged stimulus series have been reported in numerous studies. The results have repeatedly shown that when such stimuli are interpolated, judgments of the stimuli in the original stimulus series are displaced in the direction opposite the value represented by the extreme stimuli. This type of contrast has been demonstrated with a variety of affect-producing stimuli, including colors (Harris, 1929; Hunt & Volkmann, 1937), odors (Beebe-Center, 1929; N. Cohen, 1937), photographs of children (Hunt, 1941), the prestige of occupations (McGarvey, 1943), statements labeled as "fascistic" (Raskin & Cook, 1938), and statements of moral offenses or undesirable social acts (E. Cohen, 1957; Hunt, 1941; McGarvey, 1943).

Although concurrent experience with the interpolated extreme stimulus and the stimulus series being judged was assumed necessary for the production of affective contrast in early studies, it has been demonstrated that experience with a set of relatively extreme stimuli considerably in advance of the judgment of a stimulus series may also

produce contrast effect. Beebe-Center (1929) found that experience with a set of pleasant or unpleasant odors two days prior to judgment of a series of other odors produced contrast effects in the later judgments.

Imaginary extreme stimulus values have also been shown to be effective in producing contrast. Hunt and Volkmann (1937) first instructed their subjects to judge the pleasantness of a number of physically present colors on a seven-point scale. Having completed this, the subjects were then instructed to think of the most pleasant color they could imagine and to keep that color in mind as representing category seven while judging the original stimulus series again. Apparently the most pleasant imaginable color was not represented within the original stimulus series for most subjects inasmuch as the colors were judged as less pleasant than they had been in the first or control series. These results are consistent with those from studies wherein the extreme stimuli used were physically present.

Harris (1929) found that the relative extremity of affect-producing stimuli interpolated into a stimulus series is a significant determinant of the magnitude of the contrast effect obtained. The magnitude of the contrast effect was positively related to the subject's perception of the difference between the interpolated stimuli and the relatively neutral stimulus series used.

Studies in psychophysics have generally treated contrast as one aspect of anchoring effect. Using the term anchor to refer to any standard or reference point which an individual uses in making the comparison necessary for judgment, it follows that anchoring effect

would refer to any effect on the judgment of a given stimulus or set of stimuli produced by actual or hypothetical experience with an anchor or set of anchors. The necessity for this broad characterization will become apparent as the various uses of the term anchoring effect are illustrated.

The original and, perhaps, still most frequent use of anchoring effect is to refer to the effects of the end-points of a stimulus series on "absolute" judgments of the other stimuli in the series. Volkmann (1951, p. 238), Eriksen and Hake (1957, p. 132), and others have indicated that the end-stimuli are the major determinants of discrimination within a stimulus series. Absolute judgments of the end-stimuli are less variable, from the outset, than judgments of stimuli located toward the middle of the series. Moreover, intensification of the effect of the end-stimuli by a procedure known as end-anchoring (which consists of the introduction of additional stimuli which correspond to the end-stimuli) results in a reduction of errors in the judgment of the middle stimuli.

The pervasiveness of anchor effects in absolute judgments is demonstrated by the fact that judgments obtained by Eriksen and Hake (1957) showed such effects even when the subjects were required to judge a series of hues which formed a circular continuum. Two groups of subjects, responding with the number series 1-20 but differing in what response numbers were assigned to which hues, showed that discriminability of a given hue depended in part upon whether it occurred toward what the subject considered the end-points of the stimulus series or whether it occurred toward what he considered the middle portion.

The process which occurs with the introduction of an anchor at or near the end of the stimulus series is known as assimilation. Generally, it consists of an expansion of and consequent displacement of the judgmental scale toward the category assigned to the anchor. Conversely, contrast is generally described as a constriction of and consequent displacement of the judgmental scale away from the value of a remote anchor. Both expanded displacement and constricted displacement have been demonstrated in experimental studies. Inasmuch as the remaining possibility, uniform displacement, has not been systematically investigated, it will be discussed later.

According to Sherif, Taub, and Hovland:

> . . . whether one obtains an 'assimilation effect' or a 'contrast effect' depends on the position within or distance from the original series of the introduced anchors (standards). When an anchor is introduced at the end or slightly removed from the end of the series, there will be a displacement of the scale of judgment toward the anchor and assimilation of the new reference point in the series. When, however, the reference point is too remote there will be displacement in the opposite direction (i.e., away from the anchor), with a constriction of the scale to a narrower range (Sherif, Taub, & Hovland, 1958, p. 150).

The above quotation is an informal statement of the general hypothesis tested and supported in what represents the most extensive investigation of assimilation and contrast effects in simple judgments to date. While Sherif, Taub, and Hovland's (1958) study is more extensive than its predecessors, it is similar enough to earlier studies in procedure to be considered a prototype of psychophysical studies of anchoring effects.

Essentially the same procedure was used in each of three experiments reported by Sherif et al. In the first or control session of

each experiment the stimulus series was presented by the method of single stimuli. In this session the subjects were instructed to rank the stimulus series, calling the lightest weight "one." In subsequent sessions each weight in the original stimulus series was presented as the second member of a pair of weights, the first weight being an anchor. Although the subjects did not report their judgment of the anchor, they were instructed to let the first member of the pair (the anchor) define their topmost (or bottommost, depending upon the experiment) category of judgment. Thus, the subjects were to use the same numerical value for the anchor as that used for the heaviest (or lightest) weight in the original stimulus series in the first session.

The original stimulus series used in the first of the experiments consisted of six weights of 55, 75, 93, 109, 125, and 141 grams. The nine anchors used were weights of 141, 193, 219, 244, 267, 288, 312, and 347 grams. The lightest anchor (which was identical to the heaviest weight in the original stimulus series) produced an assimilation effect, as evidenced by a progressively increasing frequency of use of judgmental categories progressively nearer the anchor. The remaining eight anchors produced the opposite effect, the magnitude of the contrast effect being positively related to the distance of the anchor from the upper end of the original stimulus series.

The second and third experiments differed from the first in that anchors were introduced at or beyond the lighter end of an original stimulus series. However, both of these experiments produced results which were in agreement with those from the first experiment.

Similar assimilation and contrast effects have been demonstrated in a number of other studies using weights (Bevan & Darby, 1955; Brown, 1953; Heintz, 1950; Helson, 1947; Rogers, 1941). Such effects have also been noted in the judgment of visual inclination (Rogers, 1941; Volkmann, 1936), visual number (Kaufman, Lord, Reese, & Volkmann, 1949), auditory intensities (Long, 1937; Needham, 1935), pitch (Koester & Schoenfeld, 1946), and time interval (Postman & Miller, 1945).

Studies in psychophysics which have reported contrast have generally restricted the subject to a number of judgment categories which was less than the number of stimuli presented. The subject is typically given practice (using the method of single stimuli) with a series of, say, six weights which he is to categorize using numbers 1-6. The subject is then exposed to an anchoring session (using the method of constant stimuli) wherein he is instructed to assign the value six to a weight (the anchor) which is much heavier than any he has previously experienced in the experiment. The subject must continue using the same set of six numbers for his judgments, though he now has, in effect, seven stimuli to judge. When an anchor which is clearly different from the six stimuli in the original stimulus series occupies category 6, judgments of the six stimuli must be compressed into categories 1-5. It appears that constricted displacement of the judgmental scale would be inevitable under such circumstances. One experimental condition in the present study was designed to determine whether constricted displacement would also occur when the number of judgment categories and stimuli were equal.

A second concern in the present study was also related to the problem of the generality of the contrast effects thus far discussed. Rogers mentioned, as an incidental observation in his study of anchoring effects in the judgment of lifted weights, that regardless of his instructions to define the anchor as six, "the O's occasionally assign to one of the higher stimulus-magnitudes [anchors] a scale value higher than six. O reports a judgment of 'SEVEN' or 'EIGHT', and then immediately corrects himself, amused at the 'mistake' he has made" (Rogers, 1941, p. 25). Rogers' observation raises the question whether constricted displacement in the judgmental scale would still occur if the subjects were allowed to define the anchor as belonging in a judgment category as remote as they wish from those used for the original stimulus series. If constricted displacement is simply a function of the fact that subjects are not allowed to define the anchor in a manner which adequately describes the relationships among the stimuli, then the introduction of a remote anchor when it can be defined as the subject wishes should produce no effect on judgments of the original stimulus series.

Rogers (1941, p. 16) reported that his subjects experienced the original stimulus series as different when a remote anchor was introduced. In the present investigator's experience in studies of lifted weights, subjects have often reported that the original stimulus series seemed heavier after the introduction of a very light anchor. These observations imply that some displacement might be expected even if the subjects were allowed to define the anchor as far removed from the stimuli in the original stimulus series. If the observations mentioned

are correct, one might expect the greatest displacement to occur in the judgment of those weights nearest the anchor (i.e., constricted displacement) when, as in usual psychophysical procedures, new categories are not available which denote heavier weight than the categories previously used.

Incidental observations reported by McGarvey (1943) in a study of anchoring effects in the judgment of the prestige of occupations formed the basis of the third objective of the present study. McGarvey duplicated the procedures used by Rogers (1941) in his study of anchoring effects in the judgment of visual inclinations and lifted weights. Although her results with verbal materials as stimuli were in accord with those reported by Rogers, comments made by her subjects offer reason to question whether different results would have been obtained had it not been for the restrictions placed on the subjects' judgments.

McGarvey observed that with the introduction of more remote anchors to the stimulus series of occupations, "all of the subjects remarked on their dislike of the necessity of 'putting all these people who really don't belong together into the same category' and they constantly complained that 'Six just isn't enough categories; I can't stretch it that far except by putting everybody into the same category'" (McGarvey, 1943, p. 51).

The subjects' comments raise the question whether, instead of occurring entirely within previously used judgment categories, displacement would include new categories if they were available beyond that end of the judgmental scale farthest removed from the value assigned to the anchor. Evidence suggesting that such displacement may occur has

been reported in a number of later studies wherein the investigators used verbal stimuli (e.g., E. Cohen, 1957; Helson, Blake, Mouton, & Olmstead, 1956; Manske, 1937; Moeller & Applezweig, 1957; Russell & Robertson, 1947). It seems reasonable to expect also to find new categories used in the judgment of nonverbal stimuli, such as weights, if, when an extremely light anchor is defined as occupying the category previously assigned to the lightest of the original set of weights, the subject is allowed to shift both the lower and upper ends of his judgmental scale away from the value assigned the anchor. For reasons mentioned earlier, the same expectation would be plausible where the subject is also allowed to place the anchor in a category which is relatively remote from his judgmental scale.[1]

---

[1]All of the expectations indicated in the foregoing pages were, of course, predicated on the assumption that the difference between the anchor-stimulus and the nearest stimulus value in the original stimulus series would be extreme. It appears likely that most of these expectations would have to be modified if the difference were not extreme.

CHAPTER II

PROBLEM AND HYPOTHESES

The general hypothesis of the present study was that the magnitude of the displacement which occurs in contrast effect is a function of the availability (existence or non-existence) and location of previously unused conceptual categories. Regardless of how the anchor was defined, it was expected that displacement would be greatest in those circumstances where previously unused categories were available beyond that end of the judgmental scale farthest removed from the category assigned a remote anchor.

Before stating the general hypothesis in the specific forms appropriate for statistical tests, a few remarks about the experimental design are necessary. The experiment took place in two parts. The first part consisted of a control session wherein all subjects were presented the same series of five weights for judgment by the method of single stimuli. The subjects were then divided into five experimental groups which participated in separate anchoring sessions (each of which presented a different condition of concept availability) wherein weights were presented by the method of constant stimuli. In each anchoring session the same anchor weight, for which no judgment was reported, was presented as the first member of a pair of weights.

In one condition (see I below) the procedure traditionally used was duplicated; each of the five weights in the original stimulus series was presented for judgment as the second member of the pair. In the other four conditions, the lightest weight in the original stimulus series was replaced by an anchor-equivalent which was judged. The five experimental conditions are described below. Accordingly, judgments were obtained when:

I. There was one less concept available than the number of stimuli to be judged (since the anchor-stimulus was designated as the lowest of the previously used categories).

II. The number of concepts available equalled the number of stimuli to be judged (including the anchor-equivalent).

III. Three additional concepts were made available as an extension of that end of the judgment scale nearest the stimulus value of the anchor.

IV. Three additional concepts were made available as an extension of that end of the judgment scale farthest removed from the stimulus value of the anchor.

V. Three additional concepts were made available as an extension of each end of the judgment scale.

The relationships of the five conditions of concept availability to one another and to the stimulus series presented are illustrated in Table 1.

Table 1

Stimulus Series Presented and Concepts Available in the Five Anchoring Sessions

Experimental Condition	Stimuli Presented[a]	Concepts Available
I	A 4 5 6 7 8	4 5 6 7 8
II	A A'5 6 7 8	4 5 6 7 8
III	A A'5 6 7 8	1 2 3 4 5 6 7 8
IV	A A'5 6 7 8	4 5 6 7 8 9 10 11
V	A A'5 6 7 8	1 2 3 4 5 6 7 8 9 10 11

[a]A represents the anchor (for which no judgment was reported). A' represents the anchor-equivalent (which was judged). The numbers 4-8 refer to the weights from the original stimulus series which were used in the anchoring sessions.

Hypotheses. The specific hypotheses for the various experimental conditions were as follows:

A. Judgments of each of the four stimuli of the original stimulus series located nearest the anchor (i.e., median judgments of stimuli 4, 5, 6, and 7) will be displaced upward toward category 8 in Condition I.

B. Judgments of each of the three stimuli of the original stimulus series located nearest the anchor (i.e., median judgments of stimuli 5, 6, and 7) will be displaced upward toward category 8 in Conditions II and III.

C. The median judgments of stimulus 8 will not change in Conditions I, II, or III.

D. Judgments of each of the four stimuli from the original stimulus series (i.e., median judgments of stimuli 5, 6, 7, and 8) will be displaced upward toward category 11 in Conditions IV and V.

E. Judgments of the four stimuli from the original stimulus series (i.e., median judgments of stimuli 5, 6, 7, and 8) will be displaced more in Conditions IV and V than in Condition I, II, or III.

F. The anchor-equivalent will be assigned a lower conceptual category in Conditions III and V than that used in judgment of the same stimulus in Condition II.

CHAPTER III

METHOD

Subjects. Previous psychophysical studies have generally used the same four or five subjects over and over in the various anchoring sessions. In the present investigation 14 different subjects were randomly assigned to each experimental condition. Both male and female students from introductory psychology classes who were not familiar with the problem being investigated were used as subjects. In Condition I nine subjects were males and five were females; in Condition II eight were males and six were females; in Condition III seven were males and seven were females; in Condition IV nine were males and five were females; and, in Condition V eight were males and six were females. In all cases, only right-handed subjects were used inasmuch as the apparatus was designed for lifting with the right hand.

For reasons mentioned later, certain features of one of the anchoring conditions used by Sherif, Taub, and Hovland (1958) were duplicated in the present study. One procedural aspect of the study by Sherif et al. which was employed in the present study was their accuracy criterion for subject selection. In an effort to insure that effects found in the anchoring sessions were not a function of initial inability to discriminate among the weights, those subjects who were

unable to attain at least a 50% level of accuracy in their judgments of the original stimulus series were eliminated. In the present study, the accuracy level was determined by computing the percentage of the total number of judgments which were in accordance with the instructions given in the first, or control, session. Since only the last 100 of the 300 judgments of the original stimulus series were considered in the analysis, the accuracy criterion was therefore applied only to the last 100 judgments. Assuming random use of the five judgment categories for the five stimuli, the accuracy level expected by chance would be 20%. The probability of a subject reaching the 50% accuracy criterion by chance, as determined by chi square, is less than .005.

Apparatus and general procedure. One of the anchors and one of the series of stimuli used by Sherif, Taub, and Hovland (1958) in the study summarized earlier were duplicated (except for the size of the weight containers) in the present study. Two considerations were involved in the selection of these particular stimuli: (1) the 41 gram anchor selected for the present study had been demonstrated to produce marked contrast effects in the judgment of the other stimuli selected, and (2) the effects of the introduction of an anchor to the lighter end of a series of weights has been investigated in comparatively few studies.

The stimuli were weights presented in cylindrical containers 5.5 centimeters in diameter and 9.6 centimeters high. The weights used in the control, or standardization, session consisted of what has earlier been termed an original stimulus series of 97, 118, 137, 153, and 169 grams. For convenience, these weights are hereafter labeled as 4, 5,

6, 7, and 8 respectively.

In all of the anchoring sessions a 41 gram anchor-stimulus (for which a judgment was not reported) was presented as the standard in the method of constant stimuli. Following the procedure usually used in psychophysics, all five of the weights in the original stimulus series were presented for judgment in Condition I. In the remaining four conditions an anchor-equivalent (A') of the same weight as the anchor was substituted for stimulus 4 so that the stimulus series judged in these conditions consisted of weights A', 5, 6, 7, and 8.

The stimuli were presented in random order except for the restrictions that all stimuli appeared in the series an equal number of times and that no stimulus for which a judgment was to be indicated was presented twice in succession. Forty weights were thus ordered for the control sessions. Because the apparatus used was capable of presenting only 40 weights and because every other weight presented in the anchoring sessions was an anchor-stimulus, only the first 20 positions in the order were used in the anchoring sessions.

The order of presentation of stimuli was comparable across all control sessions and across all anchoring sessions. However, within each control or anchoring session seven different starting positions in the order were used. Within each control session a subject's starting point in the order depended upon which of seven seats he chose at the apparatus. Further, since as the subjects arrived for the anchoring session they were asked to take a different position at the apparatus than the one occupied in the control session, each subject's starting point in the order in the anchoring session differed

from his starting point in the control session.

The apparatus used to present the stimuli was so designed that seven subjects could silently make judgments simultaneously. The subjects were seated around a table, six feet in diameter, in such a way that each directly faced one side of a seven-sided enclosure which was mounted on a table top. A small opening aligned with a padded arm rest on each side of the enclosure allowed the subject to put his right hand into the enclosure. Elasticized cloth surrounding each opening fitted snugly around the subject's wrist and prevented his seeing the weights. The weights were lifted directly with the hand in a uniform wrist motion.

Judgments were reported by manipulation of a dial with the left hand. The dial consisted of a 4" pointer which the subject regulated through 90° on a numbered scale of 11 points spaced ½" apart. A linear potentiometer attached to each pointer operated a pen on a Grass EEG recorder which produced a record of the response.

Three hundred weights were presented to the subjects during each session on a platform 4' in diameter which revolved within the enclosure. Notches along the edge of the platform held 40 weights. In the event that a subject failed to return a weight to its proper place on the platform after lifting, a brass rod pushed the weight into the proper position.

A mechanical timer regulated the interval between presentations of stimuli, turned on a green light mounted on top of the enclosure when the subjects were to lift, turned the light off one second before the platform moved, and then turned on a motor which moved the platform enough to bring the next weight under the subject's hand. The motor

was turned off by a microswitch operated by one of 40 wooden blocks mounted on the platform such that one was opposite each weight. This microswitch also operated an electrical counter for the benefit of the experimenter and a solenoid which projected a brass rod into a hole in the platform to act as a brake which insured that the platform stopped in the proper position each time. Another similarly mounted microswitch turned the timer on again and the process was repeated. The apparatus operated on the following time schedule: The green light which indicated that the subject should lift came on for 3½ seconds, 1 second elapsed after the light went off, the platform moved for 2 seconds, the green light came on again, and the cycle was repeated. Thus, the subjects had a total of 6½ seconds between presentations of stimuli, a time interval which they reported was a comfortable pace.

When the green light for the fiftieth judgment went off, an electrically energized mechanical stepping switch shut off the moving parts of the apparatus and turned on a red light (which was mounted beside the green one) to indicate a rest period. Since there were 40 weights on the platform, the occurrence of the rest period after the fiftieth lift insured that the subjects would not start in the same place in the order after each rest period.

During the rest period a mechanical timer which was also energized by the stepping switch timed a 3½ minute interval, at the end of which a buzzer sounded to indicate the beginning of a new series of stimulus presentations. After the buzzer stopped, the timer turned the apparatus on again, and the entire cycle was repeated until 300 stimuli had been presented.

A calibration of the EEG record was obtained by asking each subject to turn his dial to each of the eleven positions successively. This required about two minutes altogether. Excluding the time required for instructions, each session required 1 hour which consisted of alternate intervals of 6½ minutes spent judging and 3½ minutes spent resting, plus 2 minutes spent at the end of each session in registering the numbers on the dials.

The experiment took place in two parts. Standardization of a judgmental scale by the method of single stimuli was the intent of the control session. At the beginning of the control session the subjects were shown the operation of the apparatus, were allowed to pass around and lift a 137 gram weight (stimulus 6) which they were told was "the middle weight in the series," and were given 20 practice trials to insure that each understood what he or she was to do. Twenty-four hours later the subjects were exposed to the anchoring session.

Specific procedure in each experimental condition. The procedure for each experimental condition is adequately summarized by the instructions given the subjects. The following instructions were given in all control sessions:

> This experiment is designed to determine which of two methods of judging is the more accurate. Today you will use one method; tomorrow you will use the other. Your task today is to judge five weights, in ounces, by assigning one of the numbers on your dial to each of the weights. You are to use numbers 4, 5, 6, 7, and 8 for the five weights, calling the lightest one 4 ounces, the next heavier one 5, etc. up to 8 for the heaviest one. Since the weights are in a haphazard order, you will never lift the same weight as the people on each side of you. You should not look at your neighbors' dial settings as you might be influenced to make a wrong decision.

The instructions given in the five anchoring sessions, labeled according to the experimental conditions they represent, appear below:

Condition I:

> Today you will use a different method of judging. Though the time between weights will be the same as yesterday and though only one weight will be under your hand at any time, the weights will be presented to you in pairs today. Today, first one and then another weight will be presented to you as the second member of a pair of weights. The first member of the pair will always be the same weight and although you should not make a judgment on your dial for it, you should consider it number 4. Like yesterday, you are to use numbers 4, 5, 6, 7, and 8.
>
> The first weight you will lift will be the first member of the pair, the second will be one of the weights you are to judge, the third will be the first member again, the fourth will be one you are to judge, etc.
>
> Remember, you should make a judgment on your dial only for the second weight in each pair.

Condition II:

> Same as Condition I except that the statement, "Today, first one and then another weight will be presented to you as the second member of a pair of weights" was replaced by, "You will again have five weights to judge but today first one and then another of the five will be presented to you as the second member of a pair of weights."

Condition III:

> Today you will use a different method of judging. Though the time between weights will be the same as yesterday and though only one weight will be under your hand at any time, the weights will be presented to you in pairs today. You will again have five weights to judge but today first one and then another of the five will be presented to you as the second member of a pair of weights. The first member of the pair will always be the same weight so you should not make a judgment on your dial for it. You may call the lightest weight of the five any number you choose between 1 and 4, but you must call the four heavier weights 5, 6, 7, and 8.
>
> The remaining instructions were identical to those in the last two paragraphs of the instructions given in Condition I.

Condition IV:

> Same as Condition II except that the statement, "Like yesterday, you are to use numbers 4, 5, 6, 7, and 8" was replaced by, "Except for the weight you are to call 4, you may use any numbers you choose between 5 and 11 for the other weights."

Condition V:

> Same as Condition III except that the statement, "You may call the lightest weight of the five any number you choose between 1 and 4, but you must call the four heavier weights 5, 6, 7, and 8" was replaced by, "You may use any numbers you choose from 1-11 for your judgments."

In both the control and anchoring sessions of all conditions the subjects were asked not to talk while judging and not to discuss their judgments during the rest intervals. As indicated earlier, as the subjects arrived for the anchoring session they were asked to choose a seat at the apparatus other than the one they had in the control session.

CHAPTER IV

RESULTS AND DISCUSSION

Perhaps a brief restatement of the hypotheses would be in order before presenting the results. Hypothesis A stated that the median judgments of stimuli 4, 5, 6, and 7 would be displaced upward toward category 8 in Condition I. Hypothesis B stated the same expectation for stimuli 5, 6, and 7 in Conditions II and III, where stimulus 4 was replaced by an anchor-equivalent. Hypothesis C stated that the median judgments of stimulus 8 would not change in Condition I, II, or III. Hypothesis D specified that the median judgments of stimuli 5, 6, 7, and 8 would be displaced upward toward category 11 in Conditions IV and V. Hypotheses E and F were concerned with comparisons between conditions. Hypothesis E stated that the amount of displacement in the median judgments of stimuli 5, 6, 7, and 8 would be greater in Conditions IV and V than in Condition I, II, or III. Hypothesis F indicated that the anchor-equivalent would be assigned a lower category in Conditions III and V than in Condition II.

Although the hypotheses were formulated solely in terms of displacement in the judgments of certain stimuli, the data were also analyzed for evidence of constriction (i.e., a reduction in the range of judgments in the anchoring sessions).

In order to increase the stability of the measures used, only the last 100 judgments (20 judgments of each stimulus) made in each session were treated in the analysis. Variance was also reduced by the use of the 50% accuracy criterion for subject selection which was described in Chapter III.

Inasmuch as responses in the end judgment categories were generally skewed, and since in some conditions (e.g., all control sessions and the anchoring sessions of Conditions I and II) the instructions limited the subjects to judgments of an ordinal nature, nonparametric statistics were used for the entirety of the analysis--a treatment which has been recommended by Salzinger (1956) as more appropriate than parametric techniques for the analysis of anchoring effects.

An overview of the results is presented in graphic form in Figures 1-5, wherein the median judgment of each stimulus in the control and anchoring session of each condition is plotted (Table 8 in the Appendix presents the same medians in numerical form). These medians were based on the 280 judgments of each stimulus which were made in each condition (20 judgments by each of the 14 subjects).

The earlier mentioned distinction between constricted and uniform displacement is clearly illustrated by a comparison of the lines which represent control and anchoring session judgments in Figures 2 and 4. Constricted displacement is evidenced in Figure 2 as an increase in the steepness of the line which represents anchoring session judgments. Uniform displacement is illustrated in Figure 4 wherein the lines are almost parallel.

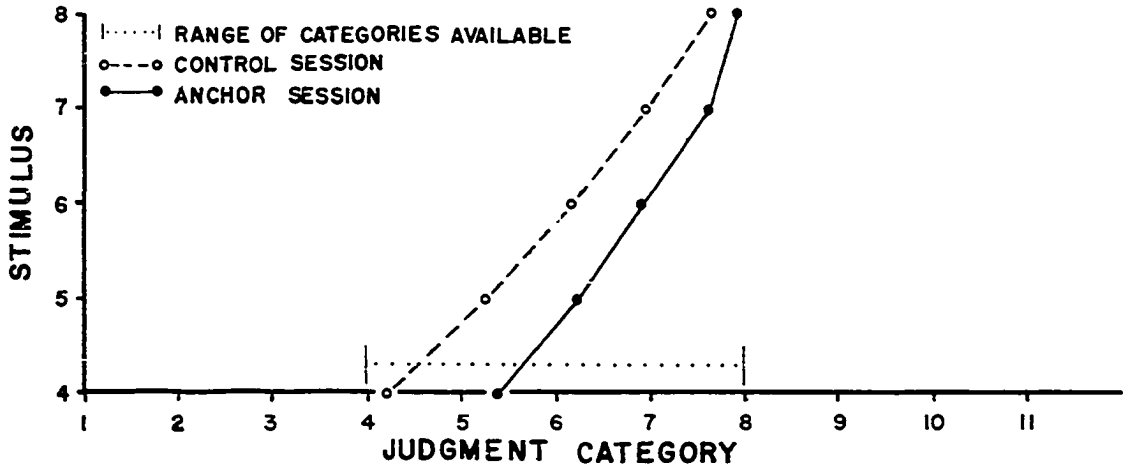


Fig. 1. Median judgments in Condition I.

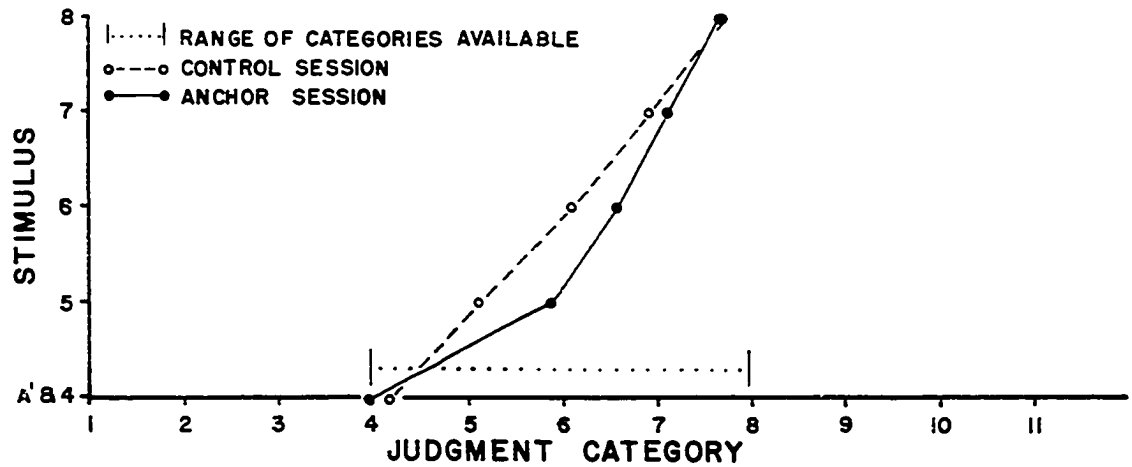


Fig. 2. Median judgments in Condition II. In the anchoring session, stimulus 4 was replaced by an anchor-equivalent (A').

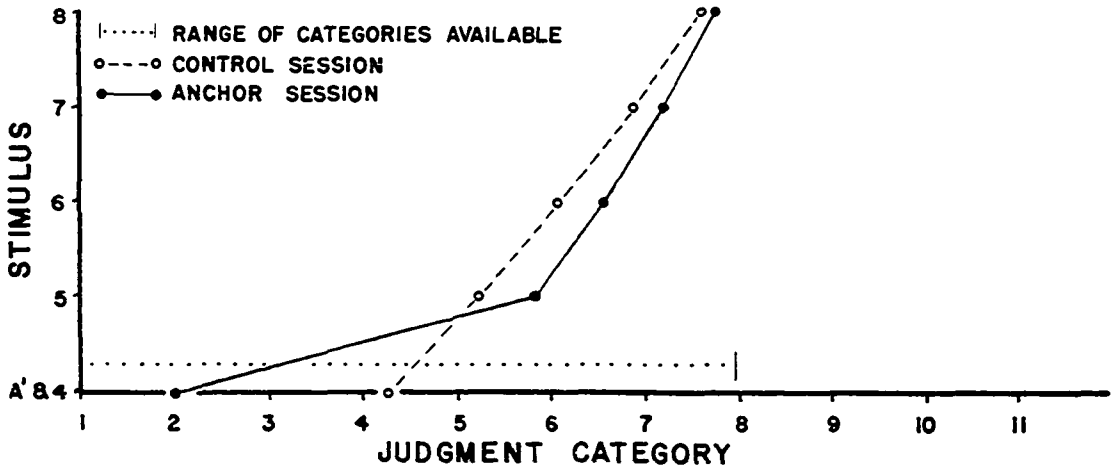


Fig. 3. Median judgments in Condition III. In the anchoring session, stimulus 4 was replaced by an anchor-equivalent (A').

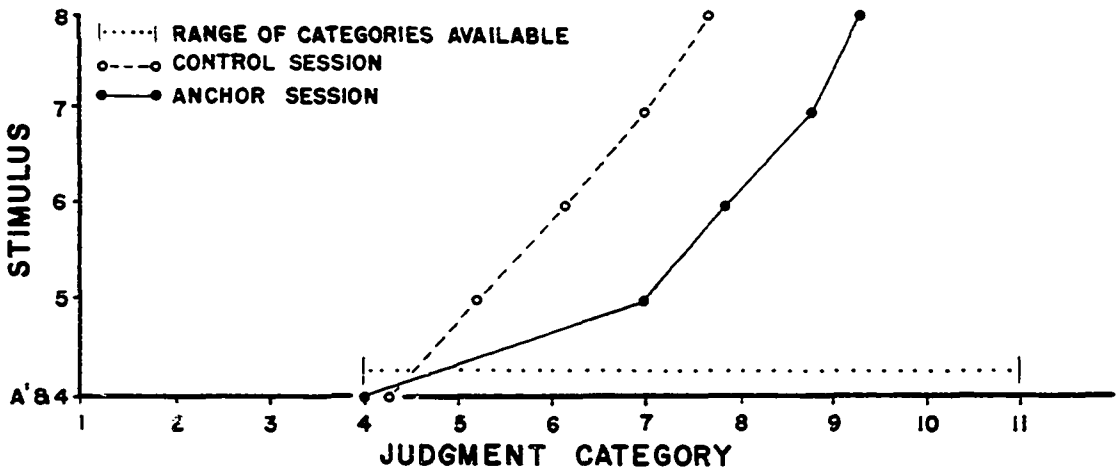


Fig. 4. Median judgments in Condition IV. In the anchoring session, stimulus 4 was replaced by an anchor-equivalent (A').

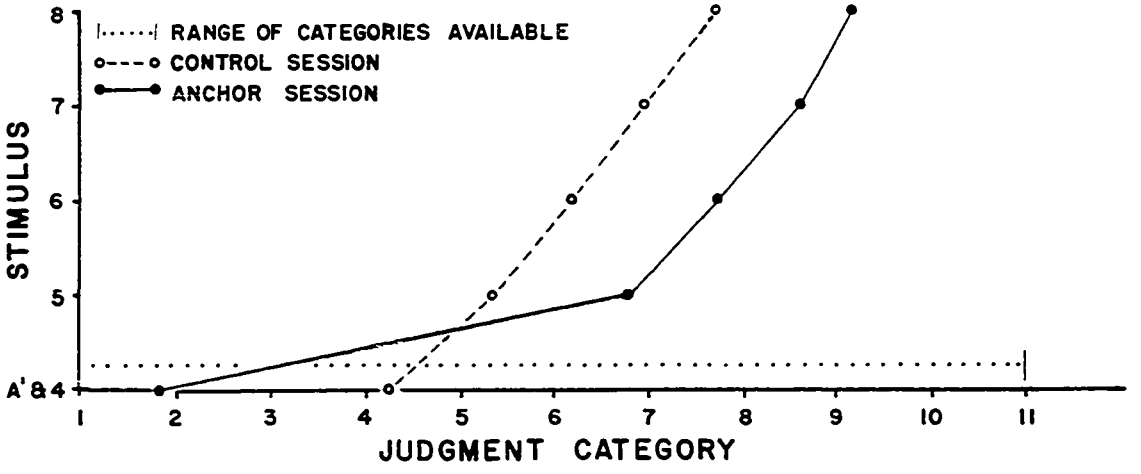


Fig. 5. Median judgments in Condition V. In the anchoring session, stimulus 4 was replaced by an anchor-equivalent (A').

Comparison of control sessions and comparison of anchoring sessions in analyses of variance. No significant differences were found among judgments made in the five control sessions. Fourteen scores were obtained for the control session of each condition by adding each subject's median judgments of the five stimuli. The 70 scores were then ranked and treated in a Kruskal-Wallis one-way analysis of variance, which produced a probability value greater than .80 (H = 1.58; df = 4).

The anchoring sessions were also compared in a Kruskal-Wallis one-way analysis of variance. Since the anchor-equivalent was not substituted for stimulus 4 in all anchoring sessions (specifically, not in Condition I), only the median judgments of stimuli 5, 6, 7, and 8 were added to obtain a score in each session for each subject. The 14 summed median scores for the control session were then subtracted from corresponding scores for the anchoring session to obtain scores which represented the total displacement in each subject's judgments.

Analysis of the total displacement scores for the five anchoring sessions yielded a probability value less than .001 ($H = 24.61$; $df = 4$).

Assessment of displacement in the anchoring sessions. Table 2 presents the results of statistical tests related to all of the hypotheses except E and F. These latter hypotheses required comparisons of independent samples of judgments between the anchoring sessions of two conditions, whereas Table 2 presents comparisons of related samples of judgments made in the control and anchoring sessions within experimental conditions. All comparisons reported in Table 2 were made with the Wilcoxon matched-pairs signed-ranks test. A median was computed for each subject's judgments of each stimulus and the 14 resulting medians for a given control session, treated as scores, were compared with the medians for the corresponding stimulus in the anchoring session. The medians referred to are presented in the Appendix in Tables 9, 10, 11, 12, and 13, which pertain, respectively, to Conditions I, II, III, IV, and V.

As Table 2 indicates, all of the hypotheses tested except that part of C which pertained to Condition I were supported. Thus, when the anchor alone or the anchor and the anchor-equivalent were introduced, the median judgments of stimuli 5, 6, 7, and 8 were displaced away from the anchor in all cases except those involving stimulus 8 in Conditions II and III, wherein no change was expected.

Judgments of stimulus 4 also underwent a significant upward displacement in the anchoring session of Condition I ($P < .005$). Though hypotheses concerning the judgment of the anchor-equivalent and the

Table 2

Comparisons of Judgments of the Original Stimulus Series in the Control and Anchoring Sessions of the Five Experimental Conditions

Tests of Hypotheses A, B, C, and D

Hypothesis	Condition	Stimulus	Direction of Shift Predicted	T[a]	N[b]	P
A	I	4	Upward	0.0	14	<.005
		5	Upward	1.0	13	<.005
		6	Upward	0.0	12	<.005
		7	Upward	1.0	14	<.005
B	II	5	Upward	4.0	14	<.005
		6	Upward	12.0	14	<.005
		7	Upward	16.0	13	<.025
	III	5	Upward	13.0	14	.005
		6	Upward	3.0	14	<.005
		7	Upward	11.5	14	<.005
C	I	8	No Change	0.0	14	<.01
	II	8	No Change	41.5	13	>.05
	III	8	No Change	27.5	13	>.05
D	IV	5	Upward	0.0	14	<.005
		6	Upward	1.0	14	<.005
		7	Upward	0.0	14	<.005
		8	Upward	2.0	14	<.005
	V	5	Upward	1.0	14	<.005
		6	Upward	0.0	14	<.005
		7	Upward	1.5	14	<.005
		8	Upward	3.0	14	<.005

Note.--Comparisons were made with the Wilcoxon matched-pairs signed-ranks test. All tests were performed on differences in judgments of the same stimulus in the control and anchoring sessions. One-tailed tests were performed for all hypotheses except C.

[a]T represents the smaller sum of like-signed ranks.

[b]N represents the number of matched pairs minus the number of pairs whose difference was 0. The original number of matched pairs was, in every case, 14.

stimulus for which it was substituted, stimulus 4, were not formulated, statistical comparisons indicated that there was a significant difference ($P < .01$) between the judgments of the two stimuli in each condition where both were used. In every case, the anchor-equivalent received a lower median judgment than did stimulus 4 in the same condition.

It was mentioned earlier that an analysis of variance performed on total displacement scores indicated that there were significant differences among the anchoring sessions. Further analysis of the total displacement scores with the Mann-Whitney U test (a test for independent samples) indicated there were no significant differences among Conditions I, II, and III or between Conditions IV and V (see Table 3). However, comparisons between the first three conditions and the last two indicated that there was significantly greater displacement in Conditions IV and V than in Conditions I, II, or III. Thus, hypothesis E was supported.

In both Condition IV and V there were a few subjects who occasionally used a fifth category for the four heavier stimuli--an occurrence which could have produced a significant degree of expansion in the judgmental scale, had it been more frequent. In these conditions (as can be determined from Tables 12 and 13 in the Appendix) one or more of the "new" concepts (evidenced by median judgments above 8.0) were used by 11 of the 14 subjects in Condition IV, and by 12 of the 14 in Condition V.

Table 3

Analysis of Displacement in the Five Anchoring Sessions

Tests of Hypothesis E

Hypothesis Tested	Conditions Compared	U	P
E	I and IV	37	<.01
E	I and V	45	<.01
E	II and IV	24	<.001
E	II and V	28	<.001
E	III and IV	26	<.001
E	III and V	30	<.001
None	I and II	60	>.05
None	I and III	60	>.05
None	II and III	98	>.10
None	IV and V	80	>.10

Note.--Comparisons were made with the Mann-Whitney U test. Probability values for tests of hypotheses are one-tailed.

Hypothesis F stated that the anchor-equivalent would be assigned a lower conceptual category in Conditions III and V than that assigned in Condition II. In testing this hypothesis, the Mann-Whitney U test was applied to the 14 medians which represented the subjects' judgments of the anchor-equivalent in each anchoring session. Comparisons were also made between the other conditions in which the anchor-equivalent was introduced.

Table 4 presents the results of the tests. As can be seen, the hypothesis in question was supported. Judgments of the anchor-equivalent in Conditions III and V were significantly lower than comparable judgments in Condition II.

There was no significant difference between judgments of the anchor-equivalent in Conditions II and IV (wherein the subjects were instructed to use category 4) or between Conditions III and V (wherein they could use lower categories for the anchor-equivalent). However, comparisons of Conditions III and V with Condition IV indicated a significant difference in each case.

Table 4

Analysis of Judgments of the Anchor-Equivalent in Conditions II, III, IV, and V

Tests of Hypothesis F

Hypothesis Tested	Conditions Compared	U	P
F	II and III	17.5	<.001
F	II and V	0.0	<.001
None	II and IV	98.0	>.10
None	III and IV	17.5	<.002
None	III and V	82.0	>.10
None	IV and V	0.0	<.002

Note.--Comparisons were made with the Mann-Whitney U test. Probability values for tests of hypotheses are one-tailed. N = 14.

The results thus far presented may be summarized as follows: With the exception of the judgments of stimulus 8 in Conditions II and III, judgments of each of the stimuli from the original stimulus series underwent a significant amount of displacement away from the anchor in all conditions. Inasmuch as the additional heavier categories provided in Conditions IV and V were generally used, the displacement was significantly greater in magnitude in these two conditions than in the

other conditions. Similarly, when categories 1, 2, and 3 were available for judgment of the light anchor-equivalent (as in Conditions III and V), they were generally used in preference to higher categories.

Assessment of changes in the range of judgments in the anchoring sessions. A significant amount of constriction in the range encompassed by the median judgments of stimuli 4 and 8 was found in the anchoring session of Condition I. Fourteen difference scores were obtained for the control session by subtracting each subject's median judgment of stimulus 4 from his median judgment of stimulus 8. The difference scores thus obtained were compared with corresponding scores from the anchoring session by the Wilcoxon matched-pairs signed-ranks test. On the assumption that constriction would be found in the anchoring session, as in previous studies, a one-tailed test was made which yielded a probability value less than .005 ($T = 0$; $N = 14$).

In Conditions II, III, IV, and V, stimulus 4 was replaced by an anchor-equivalent; therefore, comparable difference scores for these conditions were based on the range encompassed by stimuli 5 and 8. For comparative purposes, similar scores were obtained for Condition I. The results of the comparisons of the range of judgments in the control and anchoring session of each condition appear in Table 5.

A significant amount of constriction was found in Conditions I, II, and III. Since there was as much reason to expect expansion as there was to expect constriction in Conditions IV and V (where categories 9, 10, and 11 were available), two-tailed tests were performed on the data for these conditions. No significant change in the range of judgments occurred in Condition IV or V. (In fact, one-tailed tests

for expansion or constriction would not have approached significance.) Thus, the significant amount of displacement which did occur in Conditions IV and V was uniform in nature.

Table 5

Comparison of the Range of Judgments in the Control and Anchoring Session of Each Condition

Condition	T[a]	N[b]	P
I	4.0	14	<.005[c]
II	1.0	14	<.005[c]
III	27.0	14	.05[d]
IV	44.0	14	>.05[e]
V	45.5	14	>.05[e]

Note.--Comparisons were made with the Wilcoxon matched-pairs signed-ranks test.

[a]T represents the smaller sum of like-signed ranks.

[b]N represents the number of matched pairs minus the number of pairs whose difference was 0. The number of matched pairs in each condition was 14.

[c]One-tailed.

[d]One-tailed probability value computed according to procedures recommended by Siegel (1956, pp. 79-80).

[e]Two-tailed.

A Kruskal-Wallis one-way analysis of variance was performed on the above mentioned difference scores for the three conditions in which constricted displacement occurred. The analysis indicated that there was no significant difference in the amount of constriction in Conditions I, II, and III ($H = 2.93$; $df = 2$; $P > .20$).

The above results provide an answer to the question posed in Chapter I concerning the effects of having one less judgment category than the number of stimuli presented for judgment. Inasmuch as constricted displacement occurred in Conditions I, II, and III (where, respectively, there was one less category than the number of stimuli, where there were equal numbers of categories and stimuli, and where there was an excess of three categories for the judgment of the anchor-equivalent), we can conclude that constricted displacement is not limited to conditions where the subjects are allowed one less judgment category than the number of stimuli.

Some conclusions can also be drawn concerning the effect of the category assigned to the anchor-equivalent on the displacement of judgments of the four heavier stimuli. Apparently the category assigned to the anchor-equivalent, whether high or low, had no significant effect on the overall displacement of judgments of the four heavier stimuli (see the results for comparisons of Conditions I and II, I and III, II and III, and IV and V in Table 3).

One might, however, legitimately ask whether the category assigned to the anchor-equivalent affected judgments of some of the lighter stimuli, even though there was no significant effect on the total amount of displacement. If there was a significant effect of the proximity of the category assigned the anchor-equivalent, judgments of stimulus 5 and, perhaps, 6 should have been displaced more in those conditions where the anchor-equivalent was defined as relatively high (Conditions II and IV) than in those conditions where it was defined as relatively low (Conditions III and V).

Individual comparisons of the displacement in judgments of each of the four heavier stimuli were made for Conditions II and III and for Conditions IV and V. Mann-Whitney U tests performed on the two sets of 14 displacement scores for the judgment of each stimulus yielded one-tailed probability values greater than .05 for each of the four heavier stimuli (see Table 6). Thus, the category assigned to the anchor-equivalent made no significant difference in the judgment of any one of the four heavier stimuli.

Table 6

Comparisons of Displacement in the Judgments of Stimuli 5, 6, 7, and 8 in Conditions II and III and in Conditions IV and V

Conditions Compared	Stimulus	U	P
II and III	5	72.5	>.05
	6	93.0	>.05
	7	79.0	>.05
	8	72.5	>.05
IV and V	5	82.0	>.05
	6	89.0	>.05
	7	92.0	>.05
	8	76.0	>.05

Note.--Comparisons were made with the Mann-Whitney U test. Probability values are one-tailed.

The fact that the category assigned to the anchor-equivalent had no significant effect on the amount of displacement in judgment should not be construed to imply that the actual physical difference between the anchor-equivalent and the other stimuli was of no consequence. A

number of studies mentioned earlier (e.g., Rogers, 1941; Postman & Miller, 1945; Sherif, Taub, & Hovland, 1958) conclusively demonstrated that the amount of contrast obtained is a function of the physical remoteness of the anchor. The present study indicates that the amount of displacement obtained with a particular remote anchor and anchor-equivalent is a function of the location (and, perhaps, number) of concepts available for judgment of stimuli other than the anchor, not a function of the number or location of concepts available for judgment of the anchor. This conclusion is supported by the fact that there was a significantly greater total displacement in Conditions IV and V than in the other three conditions and the fact that there was no more displacement in Condition II than in III, or in Condition IV than in V.

The results of the present study also indicate that the presence or absence of constricted displacement is not a simple function of the total number of categories available for judgment. Constricted displacement occurred in Condition III (where categories 1, 2, and 3 were made available as additional categories for the anchor-equivalent) whereas uniform displacement occurred in Condition IV (where categories 9, 10, and 11 were made available for the heavier stimuli); yet, the total number of categories available in each condition was 8. This comparison indicates that the location of the additional categories was the significant variable in the production of constricted or uniform displacement. This same conclusion is supported by a comparison of all five conditions. The fact that uniform displacement occurred in Conditions IV and V indicates that the constricted displacement found in Conditions I, II, and III was a function of the limited number of

concepts available for judgment of the four heavier stimuli, not a function of the number of concepts available for judgment of the anchor.

Comparison of the present study and an earlier study. As indicated previously, except for the physical dimensions of the weights, the present study duplicated one of the sets of stimuli used by Sherif, Taub, and Hovland (1958). The procedures were essentially the same in their study and in Condition I of the present study except for the particular numbers the subjects were told to use in their judgments. Sherif et al. used numbers 1-5 whereas in the present study numbers 4-8 were used.

Comparison of the two studies sheds some light on the failure to support that part of hypothesis C which was related to Condition I in the present study. This hypothesis predicted no change in the judgment of stimulus 8 in Condition I, whereas the results showed a significant upward displacement. This finding appears to be in line with data for the same condition reported earlier by Sherif et al.

The data presented by Sherif et al. cannot be compared directly with the data thus far reported in the present study since they reported only the percentage of use of each judgment category in the control and anchoring sessions, without regard to the stimuli judged. In their study the approximate increase in the percentage of use of the highest judgment category (read from a bar graph presented by Sherif et al. [1958, p. 153, Fig. 3 B]) was from 18% in the control session to 36% in the anchoring session. Corresponding percentages for Condition I of the present study were 15.2% and 31.6%. Thus, the frequency of use of the highest category was, in each case, approximately doubled

in the anchoring session. In the present study the increase resulted from an upward displacement in the judgment of each of the four heaviest weights. An increase in the frequency of use of category 8 was demonstrated by 3 of the 14 subjects in judging stimulus 5, by 12 of the subjects in judging stimulus 6, by 13 in judging stimulus 7, and by all 14 in judging stimulus 8.

The percentage of use of each judgment category in comparable control and anchoring sessions of both the present study and that by Sherif et al. is tabulated in Table 7.

Table 7

Percentage of Use of Judgment Categories in Condition I in the Present Study and in an Equivalent Condition in a Study by Sherif, Taub, and Hovland

Study	Control Session					Anchoring Session				
Present[a] (categories 4-8)	16	19	24	25	15	1	12	24	31	32
Sherif et al.[b] (categories 1-5)	16	18	25	23	18	0	11	27	26	36

[a]Percentages were rounded and therefore do not always total 100%.

[b]Percentages were estimated from a bar graph presented by Sherif, Taub, and Hovland (1958, p. 153, Fig. 3 B).

It appears that the results for Condition I of the present study are comparable to those reported by Sherif et al. A marked increase in the frequency of use of those categories farthest removed from the category assigned to the anchor (category 4 in the present study, category 1 in Sherif et al.) is evident in both studies.

Implications of the present study. The results of the present study indicate that the extent of change in conceptualization which may occur with the introduction of a remote anchor depends upon the existence or non-existence of previously unused judgmental categories, or concepts, beyond that end of the judgmental scale which is farthest removed from the anchor. When previously unused concepts are not available in this location, change in conceptualization involves the inclusion of some of the stimuli under previously used, but different, labels (as was the case in the anchoring sessions of Conditions I, II, and III). When such previously unused concepts are available, change in conceptualization resulting from the introduction of a remote anchor involves the inclusion of previously judged stimuli under new labels (such as occurred in Conditions IV and V).

One implication of the results of this study is obvious. A change in judgment brought about through the introduction of a remote anchor can be maximized by making concepts available beyond that end of the judgmental scale which is farthest removed from the value of the anchor.

Another implication, perhaps not so obvious, merits further investigation. Phenomena conceptually similar to the contrast effects reported herein have also been reported in studies of persuasion (e.g., Helson, Blake, Mouton, & Olmstead, 1956; Knower, 1935; Manske, 1937; Moeller & Applezweig, 1957; Rosenthal, 1934; Russell & Robertson, 1947; Wilke, 1934). When propaganda advocating a position which is extremely remote from an individual's range of attitudes or stand on an issue is presented, a mixture of phenomena known as boomerang effect frequently occurs. The mixture has seldom been reported in enough detail to

permit more than very crude analysis; however, the main characteristic of boomerang effect is a displacement of attitudes away from the position advocated in the communication. In some cases displacement is so extreme that new attitudes appear to be assumed in the process (see Knower, 1935; Rosenthal, 1934; Russell & Robertson, 1947; Wilke, 1934).

Attitude scales are so constructed that it should be possible in post-propaganda assessment to differentiate among constricted displacement, uniform displacement, and expanded displacement (which is theoretically possible in contrast as well as in assimilation). Further, with appropriate modifications in the instructions given, it might be possible to determine, in advance of the propaganda, which presently unaccepted scale items are, nonetheless, considered as fairly reasonable by the individual. In the terms used in the present study, perhaps the attitudes indicated by such items could be considered relatively high in availability. If so, the availability of such attitudes (concepts) farther removed from the remote position advocated by a communicator might serve as a predictor for boomerang effects which involve assuming new attitudes.

CHAPTER V

SUMMARY

Typically, contrast effects have been produced in psychophysics under conditions wherein a series of stimuli was judged using one less judgment category than there were stimuli. The present study explored the generality of contrast effects across five conditions of category, or concept, availability.

A displacement of judgments away from the value of the anchor occurred in all experimental conditions; however, there was an important difference in the manner in which displacement occurred and a consequent difference in the amount of displacement produced in the various conditions.

The experimental conditions and the general procedure were as follows: Seventy subjects were used, 14 in each of the five experimental conditions. The subjects in each condition served both as a control group and an experimental group. Treatment was the same in all five control sessions; the subjects were presented a series of five weights, by the method of single stimuli, which they were to categorize with numbers 4-8. In the experimental, or anchoring, session an extremely light anchor weight was introduced as the first member of a pair of weights by the method of constant stimuli.

In the anchoring sessions of Conditions I and II the subjects were instructed to continue using categories 4-8 for their judgments. In Condition I the five weights which were judged in the control session were presented along with the anchor. Although the subjects were not asked to record a judgment for the anchor, they were instructed to consider it number 4. Thus, in Condition I there was one less category, or concept, than the number of stimuli presented. In Condition II the number of concepts and stimuli was equated by replacing the lightest weight in the original stimulus series with a weight equivalent to the anchor-stimulus. An anchor-equivalent was also substituted for stimulus 4 in the other three conditions. Additional categories were made available in the three remaining conditions. In Condition III, numbers 1-8 were available in the anchoring session; in Condition IV, numbers 4-11 were available; and, in Condition V, numbers 1-11 were available. In each condition where the anchor-equivalent was used, it was judged by the subjects.

There were no significant differences in the total amount of displacement among Conditions I, II, and III or between Conditions IV and V; however, there was a significantly greater amount of displacement in Conditions IV and V than in any of the other three conditions. In both Conditions IV and V, some of the "new" concepts which were available were used for judgment of the heavier stimuli.

Judgments of the three stimuli which were closest to the anchor in weight underwent a significant upward displacement in all conditions. However, displacement in the judgment of the heaviest weight was not significant in Conditions II and III.

A significant amount of constriction in the range of judgments (i.e., constricted displacement) occurred in those conditions in which additional concepts were not available beyond that end of the judgmental scale which was farthest removed from the anchor (i.e., in Conditions I, II, and III). Displacement was uniform in Conditions IV and V, wherein the "new" categories were used.

The location of the category assigned to the anchor, whether proximal or distal with regard to the concepts used for the other stimuli, had no effect on the amount of displacement in judgment.

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APPENDIX

Table 8

Median Judgment of Each Stimulus in the Control and Anchoring Session of Each Condition

Condition	Control Session					Anchoring Session					
	Stimulus					Stimulus					
	4	5	6	7	8	A'	4	5	6	7	8
I	4.20	5.25	6.15	6.94	7.64	X	5.41	6.23	6.95	7.60	7.92
II	4.20	5.16	6.13	6.95	7.77	4.01	X	5.92	6.64	7.16	7.74
III	4.27	5.26	6.11	6.91	7.64	1.99	X	5.86	6.59	7.21	7.79
IV	4.24	5.20	6.16	7.04	7.67	4.01	X	7.04	7.87	8.81	9.33
V	4.28	5.39	6.23	7.02	7.76	1.85	X	6.86	7.78	8.65	9.20

Table 9

Each Subject's Median Judgment of Each Stimulus in the Control and Anchoring Sessions of Condition I

Subject	Control Session					Anchoring Session				
	Stimulus					Stimulus				
	4	5	6	7	8	4	5	6	7	8
1.	4.22	5.17	6.14	6.97	7.59	5.40	6.50	7.03	7.50	7.83
2.	4.13	5.50	6.68	7.33	7.91	5.09	6.23	6.96	7.59	7.95
3.	4.13	5.05	6.32	6.90	7.67	5.32	6.00	6.81	7.59	7.73
4.	4.63	5.50	6.39	6.86	7.73	5.09	5.50	6.39	7.17	7.79
5.	4.03	5.19	6.03	6.79	7.33	5.25	6.23	6.88	7.17	7.88
6.	4.00	5.05	5.96	6.95	7.67	4.61	6.14	6.90	7.67	8.00
7.	4.09	5.67	6.00	6.96	7.67	4.86	5.61	6.63	7.30	7.91
8.	4.27	5.60	6.20	7.06	7.59	6.13	6.50	7.13	7.79	7.95
9.	4.03	4.96	5.89	6.07	7.13	6.10	7.00	7.67	7.95	8.00
10.[a]	4.41	5.25	6.60	7.39	7.88	5.14	6.00	6.60	7.32	7.91
11.[a]	4.06	5.05	6.10	7.00	7.70	5.94	6.86	7.17	7.95	8.00
12.[a]	4.50	5.13	5.90	6.50	7.03	5.79	6.33	6.94	7.67	7.97
13.[a]	4.93	5.59	6.27	7.12	7.88	5.27	6.13	7.00	7.73	7.95
14.[a]	4.33	5.19	6.17	6.89	7.67	5.59	6.22	6.93	7.50	7.91

[a]Female

Table 10

Each Subject's Median Judgment of Each Stimulus in the Control and Anchoring Sessions of Condition II

Subject	Control Session					Anchoring Session				
	Stimulus					Stimulus				
	4	5	6	7	8	A'	5	6	7	8
15.	4.50	5.30	6.50	6.92	7.83	4.03	6.40	6.90	7.30	7.83
16.	4.13	5.50	6.19	6.83	7.79	4.00	5.75	6.40	7.03	7.73
17.	4.03	4.94	5.80	6.79	7.50	4.00	6.17	7.00	7.59	7.88
18.	4.41	5.14	5.89	6.63	7.38	4.00	5.33	6.50	6.96	7.59
19.	4.59	5.09	6.12	6.77	7.59	4.00	5.89	6.06	6.95	7.50
20.	4.03	5.05	6.25	7.23	7.83	4.00	6.59	7.03	7.67	7.91
21.	4.21	5.40	6.10	7.12	7.73	4.03	6.06	6.80	7.12	7.67
22.	4.09	4.72	6.10	7.00	7.88	4.13	6.00	6.92	7.14	7.67
23.[a]	4.27	5.41	6.92	7.25	7.88	4.00	5.94	6.38	7.30	7.67
24.[a]	4.21	5.59	6.12	7.08	7.88	4.00	5.33	6.00	6.50	7.28
25.[a]	4.06	4.96	5.90	6.50	7.59	4.00	6.03	6.67	7.27	7.88
26.[a]	4.03	4.88	5.67	6.90	7.67	4.00	5.17	6.50	7.23	7.83
27.[a]	4.50	5.50	6.39	6.96	7.97	4.00	6.03	7.00	7.67	7.88
28.[a]	4.50	5.25	6.33	7.10	7.83	4.00	5.75	6.23	6.77	7.67

[a]Female

Table 11

Each Subject's Median Judgment of Each Stimulus in the Control and Anchoring Sessions of Condition III

Subject	Control Session					Anchoring Session				
	Stimulus					Stimulus				
	4	5	6	7	8	A'	5	6	7	8
29.	4.33	5.50	6.60	7.10	7.91	1.00	6.07	6.75	7.30	7.89
30.	4.13	5.10	6.19	6.88	7.91	1.00	6.10	7.03	7.91	8.00
31.	4.33	5.27	6.23	6.83	7.67	3.14	6.06	6.50	7.06	7.41
32.	4.70	5.86	6.21	7.33	7.88	4.00	5.50	6.41	7.30	7.67
33.	4.09	4.95	5.50	6.50	7.79	1.03	6.07	6.96	7.50	7.88
34.	4.06	4.95	6.00	6.50	7.20	1.00	5.21	6.50	7.00	7.91
35.	4.27	5.23	5.83	6.88	7.23	4.03	6.10	6.60	7.28	7.91
36.[a]	4.50	5.50	6.50	7.39	7.91	2.41	6.32	7.14	7.73	7.83
37.[a]	4.13	5.13	5.96	6.67	7.33	2.00	5.03	6.19	7.03	7.91
38.[a]	4.33	5.60	6.17	7.20	7.33	2.50	5.21	6.04	6.80	7.33
39.[a]	4.17	4.97	6.03	6.70	7.27	2.00	5.50	5.95	7.00	7.25
40.[a]	4.17	5.75	6.25	6.88	7.25	1.00	6.00	6.50	7.06	7.51
41.[a]	4.67	5.50	6.17	7.06	7.79	3.03	5.88	6.90	7.23	7.94
42.[a]	4.50	5.03	6.00	6.77	7.59	2.00	5.27	6.40	6.96	7.79

[a]Female

Table 12

Each Subject's Median Judgment of Each Stimulus in the Control and Anchoring Sessions of Condition IV

Subject	Control Session					Anchoring Session				
	Stimulus					Stimulus				
	4	5	6	7	8	A'	5	6	7	8
43.	4.33	5.33	6.14	7.19	7.59	4.00	7.39	8.36	9.32	10.79
44.	4.03	4.86	5.96	6.93	7.73	4.03	6.80	7.50	8.90	9.00
45.	4.06	5.38	6.50	7.79	7.83	4.00	7.10	8.50	9.05	9.88
46.	4.06	5.03	6.05	7.05	7.83	4.13	8.50	9.33	10.00	10.83
47.	4.13	5.00	5.93	6.27	7.25	4.00	6.75	7.67	8.41	8.95
48.	4.59	6.06	6.78	7.25	7.95	4.00	7.61	8.97	9.33	9.95
49.	4.50	5.25	5.94	6.50	7.27	4.00	5.33	6.14	7.10	7.38
50.	4.33	5.33	6.59	7.06	7.79	4.00	8.73	9.68	10.12	10.67
51.	4.17	5.21	6.68	7.59	7.91	4.00	7.50	8.20	9.10	10.17
52.[a]	4.50	5.06	6.00	6.68	7.36	4.00	5.61	6.60	7.03	7.89
53.[a]	4.41	5.21	6.03	6.78	7.40	4.03	5.41	6.00	7.07	7.27
54.[a]	4.13	4.96	5.89	7.06	7.73	4.00	6.27	7.06	7.83	8.73
55.[a]	4.43	5.21	6.09	7.00	7.41	4.00	7.28	8.17	9.67	10.79
56.[a]	4.41	5.25	6.50	7.33	7.67	4.00	7.80	8.14	9.21	9.68

[a]Female

Table 13

Each Subject's Median Judgment of Each Stimulus in the Control and Anchoring Sessions of Condition V

Subject	Control Session					Anchoring Session				
	Stimulus					Stimulus				
	4	5	6	7	8	A'	5	6	7	8
57.	4.17	5.14	6.21	7.03	7.83	2.00	7.50	8.50	9.25	9.67
58.	4.50	5.73	6.70	7.30	7.91	1.00	6.27	7.00	7.86	8.41
59.	4.17	5.78	7.67	7.88	8.00	2.00	7.90	8.50	9.73	9.91
60.	4.27	5.68	6.14	7.14	7.40	2.06	7.14	7.86	8.72	9.25
61.	4.33	5.22	6.08	6.90	7.59	3.00	7.50	8.50	9.39	10.00
62.	4.50	5.33	6.27	6.63	7.41	2.09	6.50	7.86	8.50	9.07
63.	4.09	5.10	6.00	6.83	7.79	3.00	7.27	8.75	9.73	9.88
64.	4.17	5.63	6.28	7.17	7.79	1.00	5.50	6.39	7.08	7.73
65.[a]	4.33	5.50	6.10	6.83	7.83	1.00	8.50	9.41	10.38	10.79
66.[a]	4.27	5.21	6.09	7.03	7.67	1.00	5.33	6.33	7.12	7.30
67.[a]	4.17	5.28	6.21	6.96	7.88	2.00	6.06	7.17	7.88	8.83
68.[a]	4.63	5.67	6.27	7.00	7.67	1.00	6.75	7.43	8.38	9.07
69.[a]	4.41	5.33	6.33	7.00	7.67	2.00	7.43	8.38	9.28	9.83
70.[a]	4.27	5.27	6.25	6.90	7.67	3.00	6.06	7.12	7.90	8.50

[a]Female