DIFFERENTIAL EFFECTS OF JUDGMENT SITUATIONS ON EXPERIMENTAL GROUPS

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CHAPTER I

INTRODUCTION

The purpose of this research is to determine the comparability of experimental norms formed in four judgment situations of relatively low structure. In order to compare these experimental norms, the study uses as a dependent variable the degree of compliance (Pollis & Montgomery, 1966), by experimental groups of naive subjects, to arbitrary norms presented by a confederate (an experimenter collaborator) in each of the four situations.

Normative Scales

A norm can be considered a psychological scale which defines a range of tolerable behavior in relation to a given set of stimuli (Pollis & Pollis, 1969; Sherif & Sherif, 1969). Normative scales may be formed alone by an individual or in interaction with one or more other individuals. When a norm has emerged through the interaction of two or more individuals, it is a social norm that is binding (to varying degrees) for the individuals involved. Normative scales may be classified along a continuum from psychophysical to psychosocial. Along this continuum the factors change and increase in complexity and dimensions.

As Guilford (1954) points out, psychophysical scales are directly related to physical variables which may be expressed in a quantified

form. The formation of norms has traditionally been studied in relation to phychophysical scales. With such scales the stimulus arrangement is objectively well-graded or has compelling anchorages; as a result of repeated encounters with the stimuli, "characteristic modes of behavior come into close fit with the stimulus properties" (Sherif, 1967, pp. 166-167).

In psychophysical experimentation there is generally an attempt to hold all relevant factors constant except those in which the experimenter is interested. Even in psychophysical scaling, however, control of extraneous factors is not easily maintained. Experimental conditions, such as the method of presentation of stimuli, and social factors such as experimenter suggestion and instruction, can result in differential effects on performance. As the number of relevant factors which may be broadly included under the category of "social" determinants increases and as the stimulus complexity increases, the scale becomes less one of a psychophysical nature and more classifiable as a psychosocial scale. Psychosocial scales are characterized as

> . . . scales of characteristic modes of behavior whose formation may be influenced by the relationships among interacting individuals. Features of man's relationships with man become most salient as determinants of his conformities precisely when the stimulus situation they face together is highly fluid and provides various alternatives (Sherif, 1967, p. 168).

There is no clear dichotomy between the two kinds of judgment situations. For example, the physically well-structured concepts of distance, time, and speed can be gauged only against the individual's past experience in relation to these conceptions (Sherif, Sherif, & Nebergall, 1965; Sherif & Sherif, 1969). Thus, cultural differences in experience can cause striking differences in perception, even in

psychophysical-like judgment situations.

Perhaps the laboratory situation best reflecting the middle of the psychophysical-social continuum is the autokinetic judgment situation. When all possible social factors are controlled for, and the physical factors (intensity, duration, etc.) are held constant, a natural norm consisting of a focus (mean, mode, median) and a relatively specific, narrow, range of judgments will be formed. This norm is more or less consistent from individual to individual and for each individual over time. However, it is difficult to hypothesize an actual physical stimulus continuum corresponding to the resultant response continuum, since the light does not actually move. Furthermore, the response continuum is relatively unstable since introduction of social factors is conducive to social factor-related shifts in judgment ranges, which when stabilized are highly resistant to change (MacNeil, 1964, 1967; Sherif, Sherif, & Nebergall, 1965; Sherif, 1935; Sherif & Hovland, 1961).

Studies of Norm Formation

Studies of norm formation may be categorized loosely under the headings of field studies, surveys, and laboratory studies. Some, such as the camp studies by Sherif and his associates (Sherif, 1951; Sherif, Harvey, White, Hood, & Sherif, 1961) and those by Feldman (1968,1969) and by Koslin, Haarlow, Karlins, and Pargament (1968), fall more appropriately in an intermediate category.

Field studies include research done in a "natural setting," and are often concerned with the economic, political, and physical context and with the interrelation of such factors in the setting (e.g., Whyte,

1941, 1943). This category includes phenomenological studies of norm formation outside the laboratory among children (e.g., Parten, 1933; Piaget, 1928, 1930, 1932), among adolescents (Sherif & Sherif, 1964; Thrasher, 1927; Whyte, 1943), and among adults, especially those caught in out-of-the-ordinary circumstances (Barnett, 1953; Festinger, Riecken, & Schacter, 1956; Ketchum, 1965; Leighton, 1945; Siegel, 1955). The category might be extended to phenomenological studies among animals, in which consideration of the ecology is methodologically critical (e.g., Fritsch, 1959; Kawamura, 1963; Kohler, 1925).

Surveys, generally done outside the laboratory, by their very nature normally tap norms (attitudes) which have already been formed. However, there have been at least a few longitudinal studies, using surveys, of attitude persistence and change over time (Hyman & Sheatsley, 1964; Lazarsfeld, Berelson, & Gaudet, 1948).

Generally, in both field studies and surveys the factors involved are extremely complex; no control or manipulation is attempted by the experimenter, nor would such an attempt be feasible or even desirable (Festinger & Katz, 1953). These studies are, nevertheless, important in tying social reality to norm formation theory and laboratory experimentation. Laboratory studies, while lacking generalizability, provide a relatively great amount of control of extraneous factors. These experimental norm formation studies are of primary concern in the present study, and will be discussed in some detail.

Experimental Norm Formation in the Laboratory

The methods providing the greatest amount of researcher control in studying social factors in norm formation, persistence, and change

are those used in laboratory studies using experimental norm formation judgment situations. Typically experimental norm formation judgment situations can be varied as to degree of physical structure both in regard to the specific factor being judged and the total context of the situation. With a decrease in the physical structure the importance (influence) of social factors, such as established interpersonal social relationships, can be studied (Asch, 1956; Thrasher, 1954). Furthermore, judgments made by subjects in these situations can be made in a quantified form. Experimental social norms formed in the laboratory most often consist of quantified judgments which indicate a characteristic mode and range of behavior relative to a single aspect of the stimulus situation. "This production embodies the bare essential of norm-regulated behavior" (Sherif, 1967, p. 166). The normative ranges generated lend themselves to comparisons of the proportions of judgments falling within and without specified norms within a given judgment situation.

In a review of the literature on the experimental study of social influence in "simple" judgment situations, Graham (1962) lists 73 such studies. His selection of studies ranges from the Asch-type judgment situations involving relatively unambiguous stimuli (e.g., Asch, 1952, 1953, 1956; Barron, 1952; Deutsch & Gerard, 1955; Luchins, 1955; Moeller & Applezweig, 1957) to Sherif's (1935) experiments which introduced the highly ambiguous autokinetic phenomenon as a judgment situation. The present research is concerned with judgment situations which fall near the "high" end of the ambiguity continuum.

The best known of these highly ambiguous judgment situations is that which employs the autokinetic effect. The autokinetic judgment

situation involves judgments of the perceived distance of movement of a stationary point of light in a totally dark room. Sherif's (1935) classic study demonstrated the following:

(1) When a naive subject makes judgments of autokinetic movement for the first time, he establishes his own, more or less distinct, individual norm (i.e., a range and mode of judgments);

(2) When two or three naive subjects, without previous experience in the autokinetic situation, come together and interact in making judgments of movement, a social norm is formed peculiar to that experimental social unit;

(3) When two or three subjects, who have formed individual norms in the autokinetic situation alone, are subsequently put together in the situation, the ranges of these individuals tend to converge but not to the same degree as do social norms formed when the subjects have not previously formed individual norms;

(4) When a subject has established a social norm in the autokinetic situation with other subjects, he tends to adhere to the socially established norm when he subsequently makes judgments alone in the situation.

Following Sherif's study, many other researchers have used the autokinetic phenomenon as an experimental norm formation situation. Luchins and Luchins (1963), for example, conducted a systematic study varying the conditions under which a norm in regard to autokinetic movement may be formed. Walter (1955) found that sessions that continued for several days resulted in subjects' giving less variable norms over time. Sherif and Harvey (1952), by systematically varying the degree of physical certainty in the total situation (subject

knowledge of the physical surrounds) found that norms increased in variability with a decrease in physical anchors. Bovard (1951) found that a norm formed in the autokinetic situation persisted for 28 days, and Rohrer, Baron, Hoffman, and Swander (1954) found adherence to an established social norm after a time period of one year.

Pollis and Montgomery (1966) had subjects form norms under either alone, togetherness (no established social relations) or group conditions and then studied adherence to the initial norms during subsequent social pressure by a planted majority giving a different, contingent, norm. The degree of persistence of the initial autokinetic norms was measured. Pollis and Montgomery defined compliance as a temporary perception formed in the judgment situation which did not persist under the subsequent social pressure. Conformity was defined as a persistence of the previously established norm in subsequent social pressure situations. Conformity was found to be greatest when the initial norm was formed during interpersonal interaction among subjects with previously established positive social relations. Thus, Pollis and Montgomery manipulated structure in the social aspects of the initial interaction situation rather than in the physical aspect, as might be done in using two different stimuli, differing in physical structure.

There have been a number of studies using the autokinetic effect in which arbitrary norms (norms which are statistically different from those which would form without experimenter manipulation) have been imposed on naive subjects through the use of confederates (experimenter collaborators) posing as subjects (Kelman, 1950; Linton, 1954; MacNeil, 1964, 1967; Vidulich & Kaiman, 1965; Whittaker, 1958). Other studies

have indicated that the actual presence of an individual giving arbitrary judgments is not necessary to influence naive subjects (Blake & Brehem, 1954; Hood & Sherif, 1962). Both Jacobs and Campbell (1961) and MacNeil (1964) studied the transmission of autokinetic norms over subject "generations" by establishing initial arbitrary norms with confederates and then systematically removing "old" subjects and adding "new" ones during the experiment.

Indoctrination of a subject, by having him form an arbitrary social norm during interaction with a planted majority, and subsequently studying the effect of the indoctrinated subject's arbitrary norm on other naive subjects, was introduced by MacNeil (1967) as an extension of his earlier findings (MacNeil, 1964). This innovation permits a relatively non-artificial method of introducing an unrealistic range of judgments to a social unit and has implications for applications to problems of social change.

Situations Compared in this Study

As indicated above, the autokinetic situation has been extensively used in the study of norm formation in the laboratory. Other judgment situations that can be considered to fall on the "highly ambiguous" end of the ambiguity continuum (Graham, 1962) have also been developed and used in norm studies by various researchers. At the Center for Social Psychological Studies at Oklahoma State University, three such judgment situations have been developed for use in conjuction with the autokinetic situation. It is these four judgment situations--the autokinetic, the shotgun, the pinball, and the hexagonal horizontal-vertical--which are under consideration in the present study. They

have all been used for the study of norm formation and change in experimental and natural groups at the Center for Social Psychological Studies prior to this research.

Autokinetic Situation. In the autokinetic judgment situation, the present research utilizes a standard autokinetic laboratory (Sherif, 1935), modified (increased room size and with stimulus light presented with even intensity through a 180^{o} angle) so that up to 11 subjects can participate in the situation at a given time. It has been used by MacNeil in an ongoing series of projects primarily in the study of the joint effects of status position power and degree of groupness.

Shotgun Situation. Social norms, once formed, tend to persist and are resistant to future social influence (Sherif, 1935). Therefore, in order to study norm formation power among different members within a given natural group, MacNeil (1967) developed a new judgment situation, to be used in conjunction with the autokinetic situation, to appeal to teenaged boys. The judgment task is to estimate the number of shotgun shot holes (always the same in number, but differing in pattern) purportedly made by the subjects themselves. The shot patterns judged are projected tachistoscopically on a screen for .8 seconds. This situation, which MacNeil called the shotgun target judgment situation, was patterned after a number of studies using judgment situations which require estimation of a large number of items presented visually for a short period of time (Bovard, 1953; Dittes & Kelley, 1956; Fisher, Rubinstein, & Freeman, 1956; Kaufman, Lord, Reese, & Volkmann, 1949; Mausner & Block, 1957; Pace & MacNeil, 1967; Sherif, Harvey, White, Hood, & Sherif, 1961; Volkmann, Hunt, & McGourty, 1949). This situation, originally developed as a

three-target outdoor range (MacNeil, 1967), has been modified to a five-target indoor range using a 22 caliber shotgun (Allen & MacNeil, 1969). The limits of both compliance and conformity to arbitrary norms in the shotgun situation have been established (Allen & MacNeil, 1969).

Pinball Situation. Another judgment situation, developed at the Center for Social Psychological Studies, employs auditory stimuli. This situation, which uses a modified pinball machine, was also developed to interest teenaged boys. The pinball judgment situation is an auditory judgment situation in which a pinball machine generates a preset total number of "clicks" in randomly presented short series determined by the ball's contact with the scoring pegs. The pinball machine is modified so that the subjects receive no visual indication of score and subjects judge each player's total score from the number of clicks generated in the course of play. The machine may be preset to total from 10 to 1,000 clicks for the play of each ball.

During the experimental session, each subject plays the pinball machine in turn and his "score" is estimated by all subjects during a play-back (by tape) of the "clicks) emitted during each game. An automatic shutoff actually controls the total number of clicks, which is always the same for a given experimental session. This situation was developed by MacNeil and Rebouche (1969) and is patterned after tasks that used estimation of a large number of auditory stimuli presented at a rage above the auditory subitizing limit (Blake, Helson, & Mouton, 1956; Olmstead & Blake, 1954). The total per ball used by MacNeil and Rebouche was 200 clicks. In the present research, the total was reduced to 50 clicks to speed up the game and to decrease variability of judgments in the natural norm.

Hexagonal Horizontal-Vertical Situation. The hexagonal horizontal-vertical situation has been developed to provide another darkroom judgment task similar to the autokinetic situation. The task is to judge the distance between two points of light in an otherwise dark room. The hexagonal horizontal-vertical situation utilizes, in part, the horizontal-vertical illusion to create perceptual differences in the apparent distance between two points of light.

Each presentation of stimulus light pairs consists of two lights objectively equidistant from each other but with different angles of the stimulus pair axes, thus increasing the subject's perception of differences. In other words, subjects make judgments of the distance between two lights that are always the same distance apart but differ in the angle of the axis of the stimulus light pairs. The stimulus apparatus consists of 13 lights positioned on a vertical board in two overlapping hexagonal patterns around a center light (Figure 1). The stimulus light pairs are presented in a totally dark room at a distance of approximately 15 feet from the subject. The stimulus light pairs consist of points of light approximately one millimeter in diameter and in every case 15 inches apart. The stimulus duration was .5 sec. and the interval between stimulus presentations was 30 secs. The various angles of the stimulus pairs, as well as the general ambiguity of the judgment situations, result in a range and mode of judgments natural for the conditions (MacNeil & Gregory, 1969). This situation, developed by MacNeil at the Center for Social Psychological Studies, has been used in a replication of Sherif's 1935 study of social norm formation in the autokinetic situation as well as in studies of social factors in natural group norm formation (Gregory, 1972; MacNeil and Gregory, 1969).

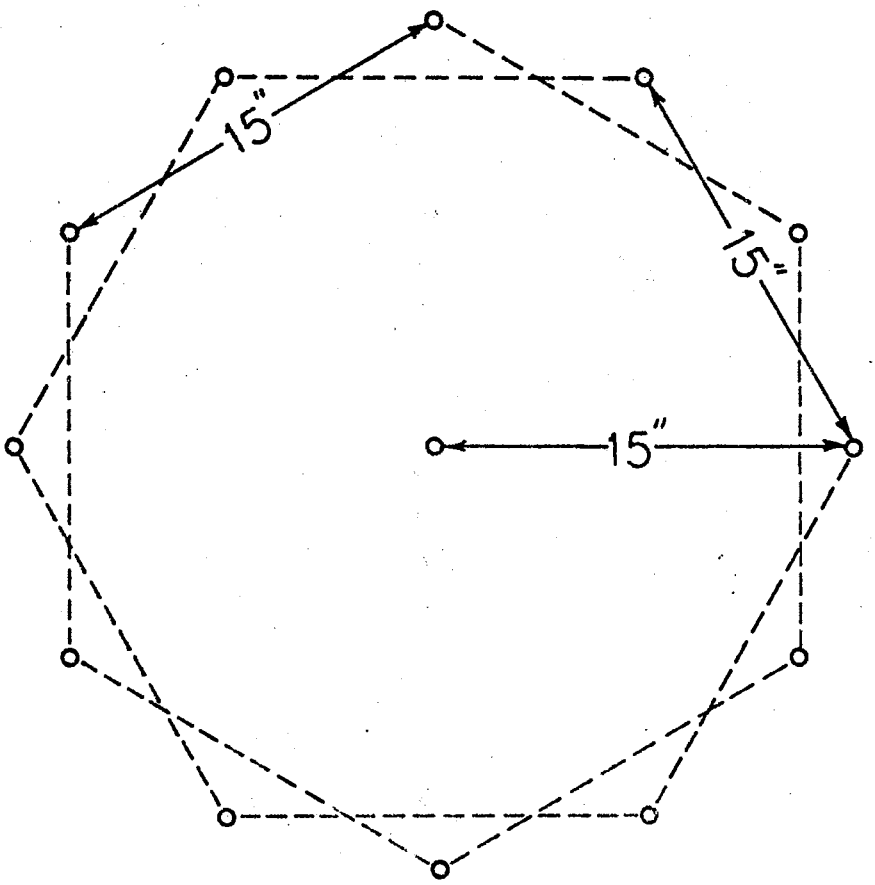

Fig. 1. Position of lights on hexagonal horizontal-vertical apparatus. Twenty-four stimulus light pairs with the lights of each pair 15 inches apart.

CHAPTER II

PROBLEM AND HYPOTHESES

Problem

The problem is to compare moderately arbitrary judgment norms experimentally established in four different judgment situations. Specifically, the four situations to be compared are the autokinetic, the shotgun, the pinball, and the hexagonal horizontal-vertical judgment situations. The term comparability, as used in this study, refers to the similarity of degrees of compliance to arbitrary norms across different experimental judgment situations.

Significance of the Study

Norms, once formed in a given situation, tend to persist and in fact become more stable over time. Therefore, when studying a number of social factors in a particular social unit, it is necessary to use a number of different judgment situations. For example, in order to study the relative power in group norm formation of individual members in a social unit, the power of an individual member to influence other members of his group in the formation of a social norm can be measured in a given judgment situation. Once a group norm has emerged for that particular situation, however, another member's ability to influence this same group must, because of the effect of the previously established group norm, be measured in another situation. Thus, in order to

evaluate relative influence (power) among group members, the comparability of the various judgment situations must be ascertained. Graham (1962), in his review of literature on experimental norm formation situations, states:

> It would be very interesting if one could conduct experiments on [compliance] in a number of different situations--for instance, to see whether [compliance] in the autokinetic situation is correlated with [compliance] in the Asch situation, in simulated groups and in other situations which do and do not involve perceptual judgments (p. 265).

Natural and Arbitrary Norms

As previously stated, a norm is a standardized way of seeing or doing things. In a quantified norm formation judgment situation, the norm that emerges is defined by the distribution of judgments made, over a series of judgment trials. This distribution, of course, includes both the range (latitude) and the focus (central tendency) of the judgments.

One of the important factors in describing a norm is the degree of arbitrariness of the norm for the conditions under which it exists. The degree of arbitrariness of a given norm may be placed on a theoretical continuum from least to most arbitrary. The least arbitrary norm is called the natural norm. The natural norm is that norm (defined by a range and focus) which, under the conditions, will develop in the absence of external (experimenter) influence.

The more unrealistic (unnatural) the norm that develops, the more arbitrary it is.

> Degree of arbitrariness may be defined in terms of discrepancy from the natural norm. This definition is appropriate for both the focus and latitude of either an individual or a group norm, i.e., the judgment distribution of individual members, or of a group (MacNeil, 1967, p. 20).

The factors which determine the range and mode of the natural norm, and an imposable arbitrary norm, for a particular experimental judgment situation are related to the degree of structure in the situation. For a judgment situation to allow social factors to influence subject judgments, the degree of physical structure must be relatively low. The degree of physical structure which is desired is that at which there is sufficient ambiguity to obtain a specifiable and relatively narrow range of judgments with one or more naive subjects, yet with a sufficient degree of structure that subjects do not feel that the task is futile and make random judgments or otherwise "give up."

Since the total amount of structure in a given situation is dependent on a highly complex set of interacting factors, it is, at this time at least, difficult to determine the degree of structure in a situation, independently of the judgments given by subjects in the situation. Thus, when a judgment situation is being developed, certain factors must be systematically manipulated until the correct (desired) balance is achieved to result in a natural norm that is relatively stable in terms of judgment variability from subject to subject and for an individual subject over time.

As a result of these manipulations, i.e., the establishment of a standardized set of conditions for the situation, natural norms were determined for the four judgment situations during previously conducted research. These natural norm ranges are shown in Table I. The natural norms are those that emerged, using both individual and experimental group subjects, without experimenter manipulation of social factors, under specified conditions of the physical stimulus and surrounds. During these sessions, subjects gave judgments in the autokinetic

situation in increments of one inch, judgments in the hexagonal horizontal-vertical were given to the nearest even two inches, and judgments in both the shotgun and pinball situations were given in increments of five shotholes or clicks.

TABLE I

NATURAL AND ARBITRARY NORM RANGES FOR AUTOKINETIC, SHOTGUN, PINBALL, AND HEXAGONAL HORIZONTAL-VERTICAL JUDGMENT SITUATIONS

Situation	Judgment Reference	Ranges for Situation	
		Natural	Arbitrary
Autokinetic	Distance moved in Inches	2 - 9	12 - 18
Shotgun	Number of Shotholes	40 - 120	125 - 155
Pinball	Number of Clicks	40 - 85	90 - 120
Hexagonal Horizontal-Vertical	Distance between in Inches	12 - 24	28 - 40

In MacNeil's (1967) study of status power in norm formation, it was found that in both the autokinetic and shotgun judgment situations, a moderately arbitrary range of judgments, i.e., a range of judgments contingent to the natural norm judgment range, could be successfully imposed on a single naive subject by four experimenter confederates acting as subjects. Further, this arbitrary norm would persist as the subject's own norm for at least 24 hours. Therefore, given the natural

norms determined through pretesting, the arbitrary norms used in the present study were all set contingent to the natural norm, as shown in Table I.

There are several ways to expose one or more naive subjects to arbitrary norms in an experimental norm formation session in the laboratory; experimenter suggestion (Pollis, 1967; Pollis & Montgomery, 1966; Walter, 1955), overheard judgments (Hood & Sherif, 1962), and social interaction with planted confederates (Asch, 1952, 1953, 1956; Jacobs & Campbell, 1961; MacNeil, 1964, 1967) are techniques that have been used. Hoffman, Swander, Baron, and Rohrer (1953) "trained" subjects with a moving light to establish a range of perceived movement in subsequent sessions in the autokinetic situation. Harvey and Consalvi (1960), using judgments of distance between two points of lights, used objectively different distances between lights for different subjects in what was otherwise the same situation.

Since norms typically emerge during interpersonal interaction over time (Sherif & Sherif, 1969), the least artificial method of imposing a range of judgments on naive subjects in the laboratory appears to be through subject interaction. MacNeil (1967), studying natural groups, used a planted majority of four to indoctrinate one naive subject, in the course of interpersonal interaction, with moderately arbitrary norms in the autokinetic and shotgun situations and subsequently measured the power of the indoctrinated subject to influence the emerging norm in his natural group. Since the subjects of the present study have no previously established social relations, i.e., all members of an experimental unit are strangers to one another, the procedure is simplified by having one confederate, purportedly just another

subject, give judgments within the arbitrary norm range in a four person experimental social unit.

Social Factors in Norm Formation

This study intends to determine whether or not certain social factors have the same effect on subject judgments across four different judgment situations. The specific question being asked is, given a certain constant level of social pressure across four different judgment situations, will the judgments made by subjects be equally influenced by the exposure to norms of similar low degree of arbitrariness across all judgment situations? Conversely, will there be differences across situations, reflecting differences in the degree of physical structure, or other salient aspects, of the situations?

In order to test the above stated question adequately, the social factor involved must be strong enough to have some effect on subject judgments. On the other hand, it must not be so strong that all subjects are maximally influenced, regardless of the situation. In other words, the experimenter introduced social pressure should not be so powerful that it results in complete subject acceptance of the arbitrary norms regardless of the degree of physical structure of the judgment situation. The major social factors to be controlled for include the amount of previously established social relations among the participants and the ratio of confederates to naive subjects in each experimental unit.

Social Relations. Previously established social relations, if any, and amount and degree of interaction must be held as constant as possible across situations to detect the effect of non-social factor

caused differences in the situations. It is difficult to measure, and match, levels of social relations among individuals except to dichotomize between individuals with previously established social relationships with each other versus those who have had no previous contact. Because social relations vary widely in degree and kind, it seems advisable at this state to use for this study subjects who are strangers to each other. In addition, to maintain a low level of interaction during the experiment, interaction among subjects must be restricted to the judgment situation of concern.

Confederates. Asch (1956) found that a planted majority of three giving incorrect responses (when matching lines to a standard) had a greater effect on subject answers than when only one or two plants answered incorrectly. (More than three plants, however, did not seem to have any additional effect.) In addition, Asch observed that the presence of another naive subject or a plant giving correct answers even with a planted majority giving incorrect answers, resulted in a sharp reduction in subject errors. These results apparently were consistent, regardless of the differences among the comparison lines or between the standard and comparison lines, although, as might be expected, errors were greater when the differences became harder to discriminate.

The "line" situation used by Asch, however, is less ambiguous than the judgment situations in this study (Graham, 1962; Sherif & Sherif, 1969) and it is well documented that, all other factors being equal, the more ambiguous (unstructured) the physical stimulus the greater the influence of social factors (Coffin, 1941; Luchins, 1945; Sherif & Sherif, 1969; Thrasher, 1954). The maximum effect of majority

opinion in Asch's (1956) study is one-third errors, whereas MacNeil (1967), using two of the judgment situations included in this study, found that the judgments of all single naive subjects during interaction with four plants were from 77 to 100 percent within the arbitrary range given by the plants.

Since it is necessary to keep social pressure at a low enough level to avoid masking differences in the physical structure across situations, the design in the present study calls for experimental groups of three naive subjects and only one experimenter collaborator. This should provide a social situation highly sensitive to differences among the judgment situations. The amount of social pressure must, insofar as possible, be kept constant for a group across all situations. Therefore, for a particular experimental group, the same confederate must act as a subject as the group participates in all four judgment situations.

Hypotheses

On the basis of previous research, summarized in the preceding pages, two assumptions may be made regarding the emergence of norms, under conditions of relatively low social pressure, in the autokinetic, the shotgun, the pinball, and the hexagonal horizontal-vertical judgment situations. First, it is assumed that, without experimenter manipulation in the form of arbitrary judgments given by the confederate, naive subjects would give judgments primarily within the natural norm judgment range, i.e., below the prescribed arbitrary range. Second, it is assumed that when a moderately arbitrary judgment norm is presented by a single individual to a majority of participating

naive subjects in each of the four judgment situations, the arbitrary judgment range in each case will affect, to a specifiable degree, the judgments made by the naive subjects. In regard to each judgment situation, the effect that the experimenter prescribed, collaborator presented, arbitrary norm has on the naive subjects' judgments may be indicated, following statistical transformation, by the judgment medians.

The following hypotheses were advanced concerning the experimental norms formed in the four judgment situations:

1. There is no significant difference among the group norms formed by the experimental groups in a given judgment situation, as indicated by lack of differences between judgment medians across groups.

2. There is no significant difference among the group norms formed by the individuals who interact in the four judgment situations, as indicated by lack of differences between the transformed judgment medians from one situation to another.

CHAPTER III

PROCEDURE

Ss were 24 (12 males, 12 females) undergraduate students from Introductory Psychology classes at Oklahoma State University. There were four experimental groups of males and four of females. A different confederate, of the same sex as the Ss in a particular group, was used for each experimental group, with each confederate participating with his particular group through all judgment situations. Ss did not know the other Ss or the confederate, and care was taken to keep interaction to a minimum before and during the experiment in order to reduce the establishment of social relations. Each confederate previously had been trained and rehearsed in giving the experimenter prescribed arbitrary norm for each of the judgment situations.

Four experimental norm formation judgment situations were used: the autokinetic (AK), the shotgun (SG), the pinball (PB), and the hexagonal horizontal-vertical (Hex) judgment situations. Each experimental group participated in all four situations, with the order of presentation of the situations counterbalanced across groups (Table II).

The Hex and the AK situations utilize a light proof and sound deadened room. Room dimensions and experiment arrangement are shown in Figure 2. Immediately outside the AK-Hex laboratory is a conference room used for general orientation and for a ten-minute dark adaptation

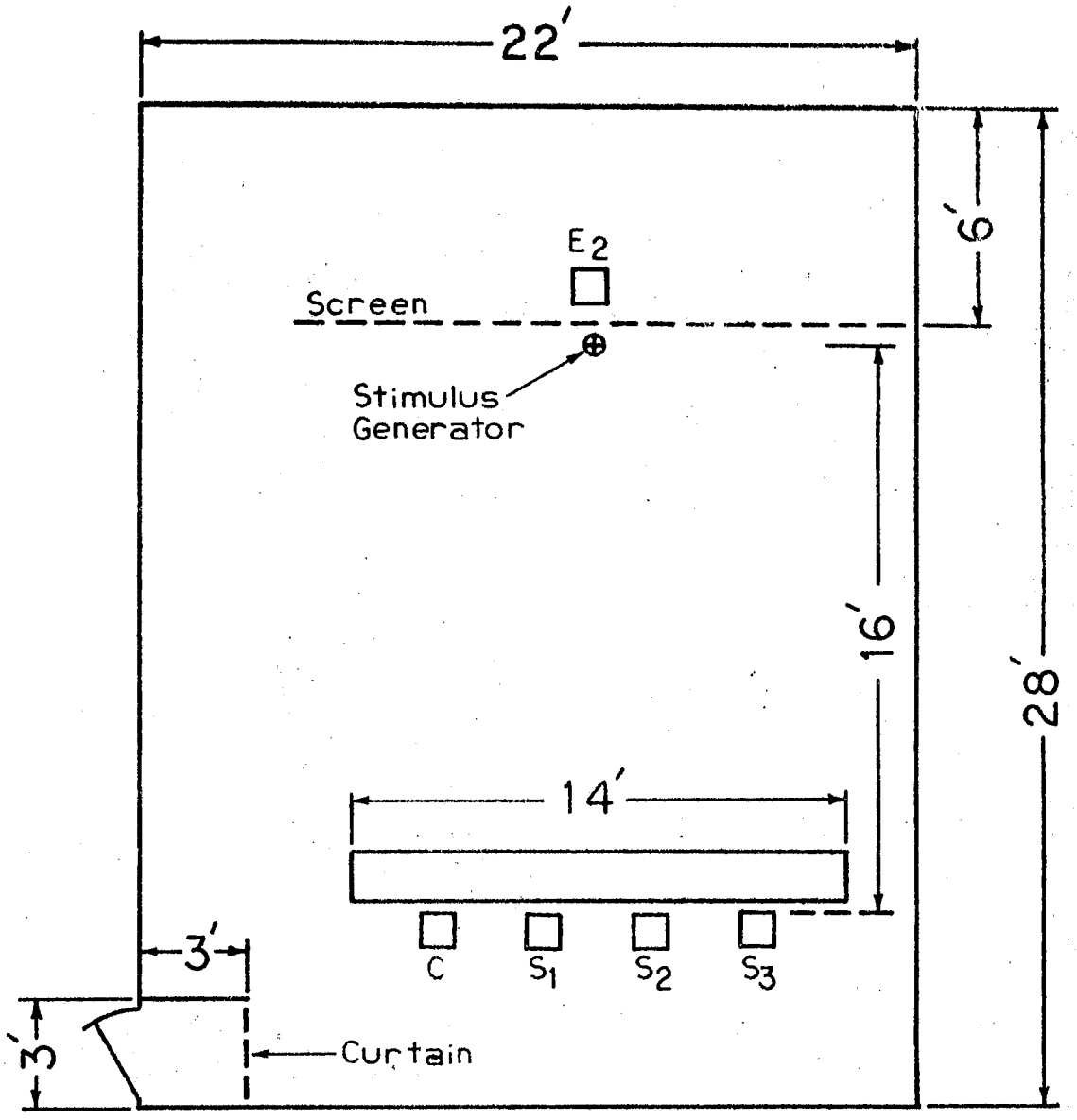

Fig. 2. Dimensions of laboratory used for both the autokinetic (AK) and hexagonal horizontal-vertical (Hex) judgment situations. C: confederate; S: subject; E: experimenter.

prior to Ss' entering the AK-Hex laboratory. The laboratory for the PB situation is also located adjacent to the conference room. The dimensions and arrangement of the PB laboratory are shown in Figure 3.

TABLE II

ORDER OF GROUP'S PARTICIPATION IN JUDGMENT SITUATIONS

Group	Order of Participation in Judgment Situations			
	1	2	3	4
A	PB	SG	AK	Hex
B	AK	PB	Hex	SG
C	SG	Hex	PB	AK
D	Hex	AK	SG	PB
E	Hex	PB	AK	SG
F	AK	Hex	SG	PB
G	SG	AK	PB	Hex
H	PB	Hex	SG	AK

Note.--PB: Pinball Situation
SG: Shotgun Situation
AK: Autokinetic Situation
Hex: Hexagonal Horizontal-Vertical Situation

The SG range and its related judgment area are located in a large room in the same building as the other laboratories. The screen on which the SG stimuli are projected is located so as to swing out at a distance of 23' in front of the Ss. The timer-controlled projector

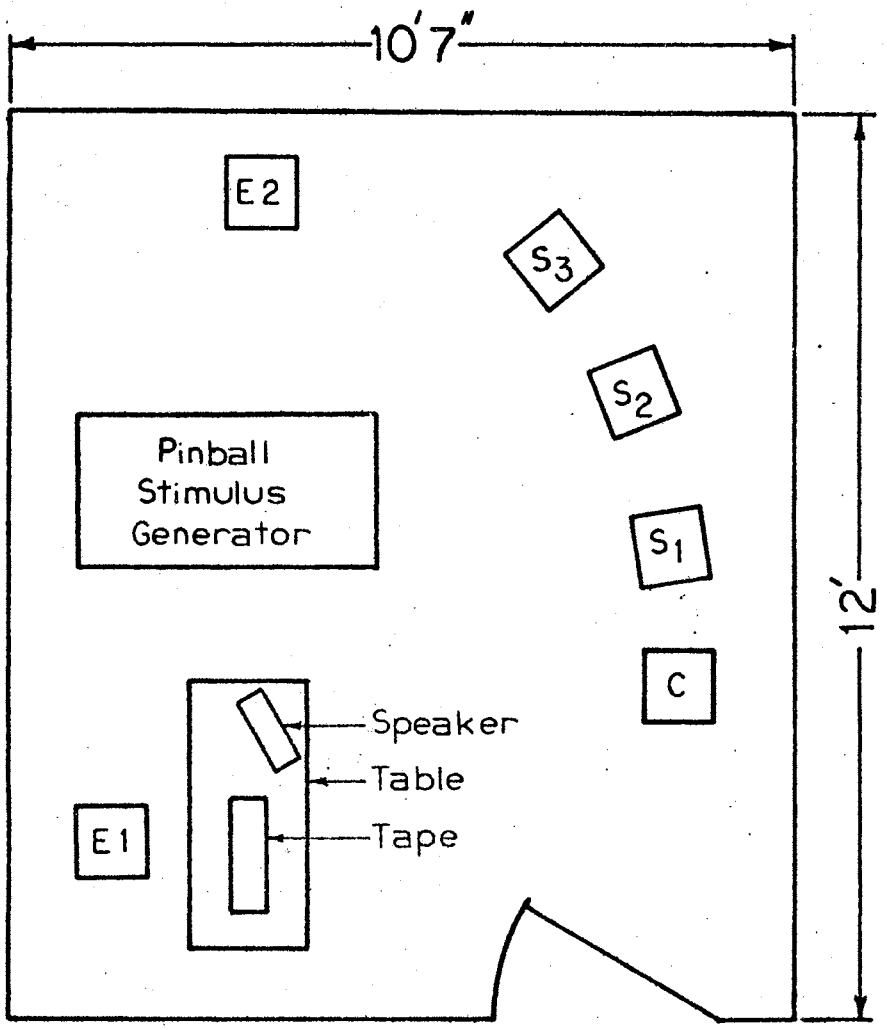

Fig. 3. Dimensions of laboratory used for the pinball (PB) judgment situation. C: confederate; S: subject; E: experimenter.

from which the stimuli are presented is located in a booth 13' behind the 2'1" x 7'2" translucent screen. The screen is folded back against the wall while Ss are shooting. Room dimensions and arrangement are given in Figure 4.

General Procedure

Ss were brought to the laboratory in experimental social units of four persons, one of whom was an experimenter collaborator (confederate). Each group was met by the experimenter (E1) and her assistant (E2) in a reception room. (From this point, all members of the experimental groups are referred to as Ss, including the confederate, unless clarification is necessary.)

Ss were then escorted, as a group, to the "briefing" room which was provided with red lights and also served as a dark adaptation room for the AK and the Hex situations. E1 and E2 seated the Ss on chairs around a large table. The names of the Ss were checked from a list, and when the confederate's name was read aloud, E2 casually remarked that (the confederate) had participated before.

At this point E2 gave, from memory, the following general information to the experimental group:

> Let me tell you what we are doing here, and about the situations you will be participating in this morning (afternoon)--the games we will be playing--and why we are doing this. Computers, I'm sure you know, do many complicated problems very quickly. Computers really depend on the information, the data, put into them and the program--that is, instructions on how to handle, what to do with, the data. Well, computers were, and are, designed to do the same things people do to solve problems. We know, because we built them, a great deal about how computers solve problems--but, in a way, we know a great deal less about how the model we designed the computers on--the human mind--does the same things.

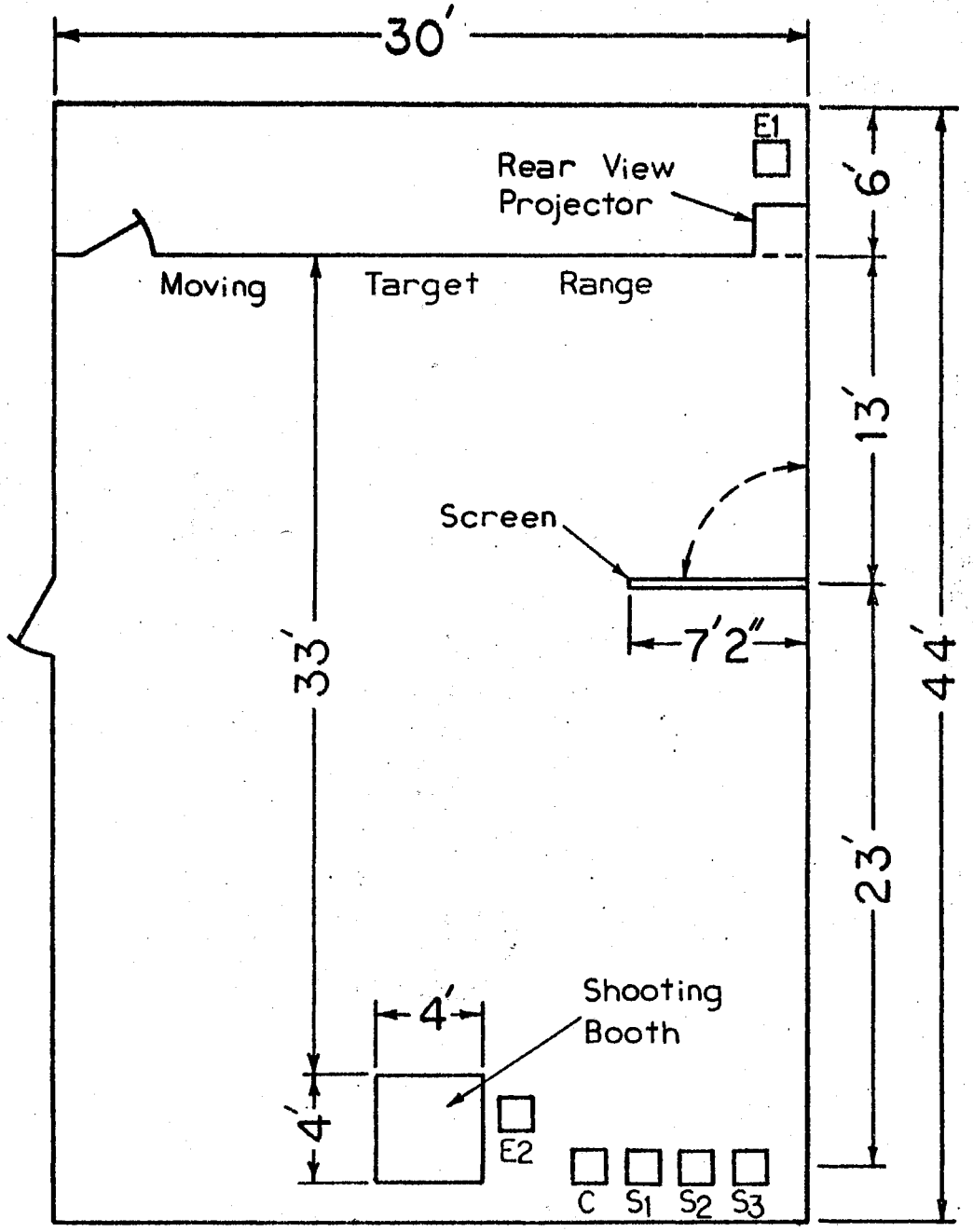

Fig. 4. Dimensions of laboratory used for the shotgun (SG) judgment situation. C: confederate; S: subject; E: experimenter.

For example, take a ten to twelve year old boy--a Little League baseball player, maybe your kid brother, a neighbor's kid, or yourself a few years back. Anyway, you know what I mean. This youngster is playing in the outfield. A batter hits a high fly sort of in his general direction and sometimes he catches it. He may not hang onto the ball but usually he manages to get pretty close to it.

Now let's look at the problem this kid has solved. The trajectory of the ball, its flight path, depends on a number of factors: the speed and spin of the thrown ball, the angle at which the bat hits it, where on the bat it hits, the winds aloft, and a few other ballistic factors. Our fielder looks at the ball with his naked eyeball, no radar, no plotting board, and plots the data concerning the flight path, without consciously following any problem solving formula, determines the intercept point, moves himself to the vicinity of that point, and maybe, what?, five, seven, or eight times out of ten? snags the ball. He does as well, on the basis of a minimal amount of data, as our most complex radar tracking computer-linked missle intercept systems do.

We feel that the human mind can solve problems on the basis of very little information very well--when we give it a chance. That is, when we don't try to do, consciously, mental arithmetic to estimate distances, how many objects there are, how fast things are moving, and the like.

These experiments are to try to find out how well the mind can do on the basis of minimal information. Not that every estimate you make will be one-hundred percent accurate; they won't be. But we want to find out what percentages of the time you are accurate--what the probability of error is and how great the average error tends to be.

Why, you're probably thinking, do they want to know this? Well, aside from just plain scientific curiosity, there are some practical reasons. You probably remember that the question came up on recent space flights, whether or not to abandon the mission when electronic gadgetry went out of whack. You probably also recall that there was some delay before the decision was reached. Decisions of this kind are made, usually, on the basis of the probability of success with the human pilots taking over the functions of the electronic components, including computers.

We need a great deal more information on the probabilities of human accuracy and the probable size of errors than we currently have. To obtain this information, research projects such as the one you are participating in are being conducted across a wide range of subjects, teenagers, college aged people, older people--and of course both sexes. They are being conducted in different regions of the country--Pennsylvania, Texas, Oklahoma, and other places.

Some of the situations we will be in are games, some are strictly laboratory situations. Again this is to give us a wide range of different types of problem solving situations--also the games help, when we use teenaged subjects, to keep them interested.

> Now, let me emphasize this. The only way your judgments will help us is for you to give every judgment just as accurately as you can. Please try really hard to do this. Each and every judgment is important. Call'em just the way you see'em. This is a real, and important, research project in psychophysics--that is, how the mind handles data from the physical world. It is funded by the National Science Foundation and many areas of science are interested in the information we get. Please do your best to give the most accurate judgments you possibly can and make the part of the research you are in good.

Each experimental group then participated in all four judgment situations in the sequence indicated in Table II. Each situation was preceded by specific instructions for that particular judgment task, and in each situation 30 judgments were made by each S and the confederate. The confederate gave judgments that were in the experimenter prescribed moderately arbitrary range for each particular situation. These judgments were randomly presented by the confederate with the frequency distribution approximating a normal distribution (Table III).

TABLE III

FREQUENCY DISTRIBUTION OF 30 JUDGMENTS, PRESENTED RANDOMLY BY CONFEDERATE, IN EACH JUDGMENT SITUATION

f	Inches AK	Shotholes SG	Clicks PB	Inches Hex
1	12	125	90	28
4	13	130	95	30
6	14	135	100	32
8	15	140	105	34
6	16	145	110	36
4	17	150	115	38
1	18	155	120	40

Specific Procedure

Autokinetic Situation. A five minute dark adaptation period took place in the same room as that used for the general orientation. The only room illumination was from two 15 watt, red, light bulbs in hooded table lamps. Following dark adaptation, E2 led Ss into the AK laboratory and seated them in chairs behind a table. In the laboratory, E2 followed the technique and specific instructions developed and used by Sherif (1935) and MacNeil (1964, 1967). Standing in front of the Ss, E2 gave the following instructions:

> The task in this situation is to judge the distance of movement of a point of light. We will do it this way. I will give you a signal, "ready," and show you a small point of light. As soon as the light appears, it will begin to move. In a few seconds the light will disappear. As soon as it disappears, give the most accurate estimate you can of the total distance of movement from where the light first appeared to where it finally stops. If the light swerves or turns, give the estimate from the point where it started to the point where it finally stopped. Now, we will give the estimates in order from your left to your right; in other words, the first person will give his (her) first name and then give his (her) estimate, and the second person will give his (her) name and then his (her) estimate, and so on right down the line. We are not interested at this time in the direction of movement or the type of movement. All we are interested in is the total distance from where the light starts to where it finally stops. Let me go through it again now. I will show you a point of light. As soon as the light appears, it will begin to move. In a little while the light will go off. As soon as the light goes off, give me your best estimate of the total distance, only the total distance, of the movement of the light. Are there any questions?

E2 then left the table where the Ss were seated and moved toward the autokinetic stimulus generator, remarking as he moved:

> These distances are all programmed in the machine and the machine is set to come around at a set interval. You'll have plenty of time to give your judgments, which, indidentally, you should give to the nearest inch. But you should give your judgments immediately after the light goes out so that the time will be sufficient. We will do it a

couple of times for practice first. I will now show you the point of light. Does everybody see the point of light?

Thirty judgments were made, in turn, by the three Ss and the confederate, with the confederate making his or her judgment first each time. The data were recorded by E2 as given by the Ss.

Shotgun Situation. Ss had two tasks in the shotgun target judgment situation. First, they were to take turns shooting a gun, a pump-model (Remington) 22 caliber smooth bore, at moving targets which were rabbit silhouettes (Figure 5). Second, they were to judge the total number of holes made in each of the targets as the targets were projected on a screen (Figures 4 & 6). The targets which were judged were actually slides with different patterns of "holes" to simulate real targets, and each mock target had the same number of holes (50).

E2 seated the experimental group side by side on wooden "tablet arm" chairs in the back of the shotgun range, to the rear and one side of the firing booth (Figure 4). E2 then showed Ss the gun and gave the following instructions:

> What we are going to do here is judge the number of dots in a pattern and you are going to make the patterns using this 22 caliber shotgun. Let me show you how this shotgun works. Most of you are probably familiar with it. It is a standard pump-type Remington shotgun. The most important thing to know about this gun is that you pull the slide all the way back and all the way forward. Give it a good firm pull back and push forward, between each shot [E2 demonstrates]. When I give you the gun in the booth here, the gun will be loaded, the safety will be off, and all you have to do is point it down at the apertures in the front of the range and when the little rabbit silhouette appears in the apertures, pull the trigger. Now this is a specially made 22. It is completely smooth bore and as you can see, the end is about the size of a 410 shotgun here at the muzzle. This means that you don't have to be a good shot to hit the rabbit. As a matter of fact it would be almost impossible for you to miss it, but don't try to miss it. Just point it at the hole, and as the rabbit appears at the hole, pull the trigger. After you have shot at five rabbit silhouettes, one in each of the five holes

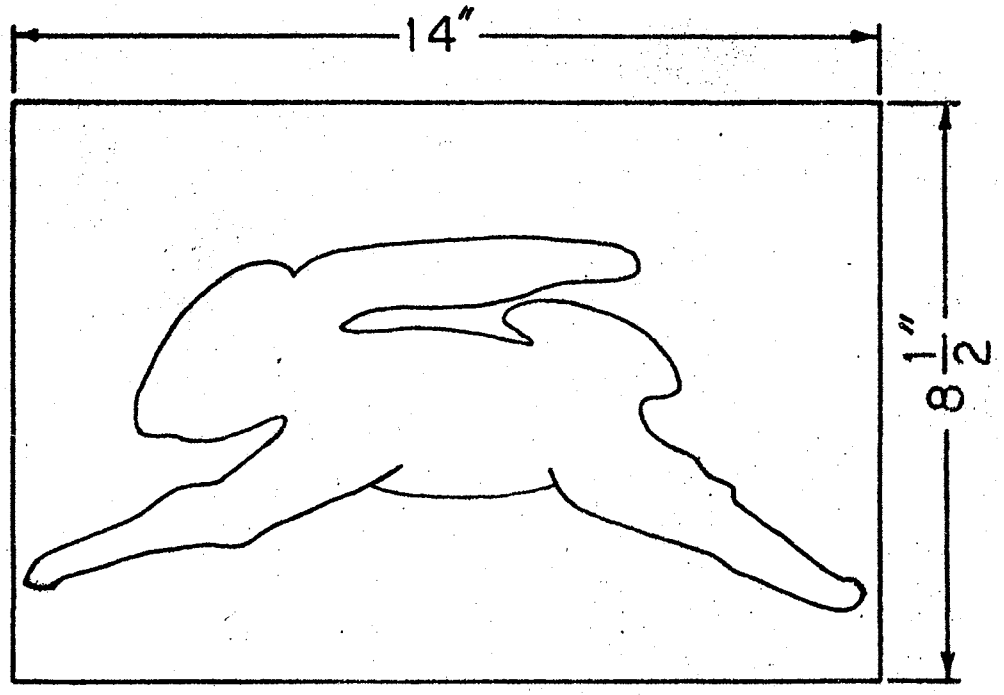

Fig. 5. Rabbit outline target used in shotgun judgment situation.

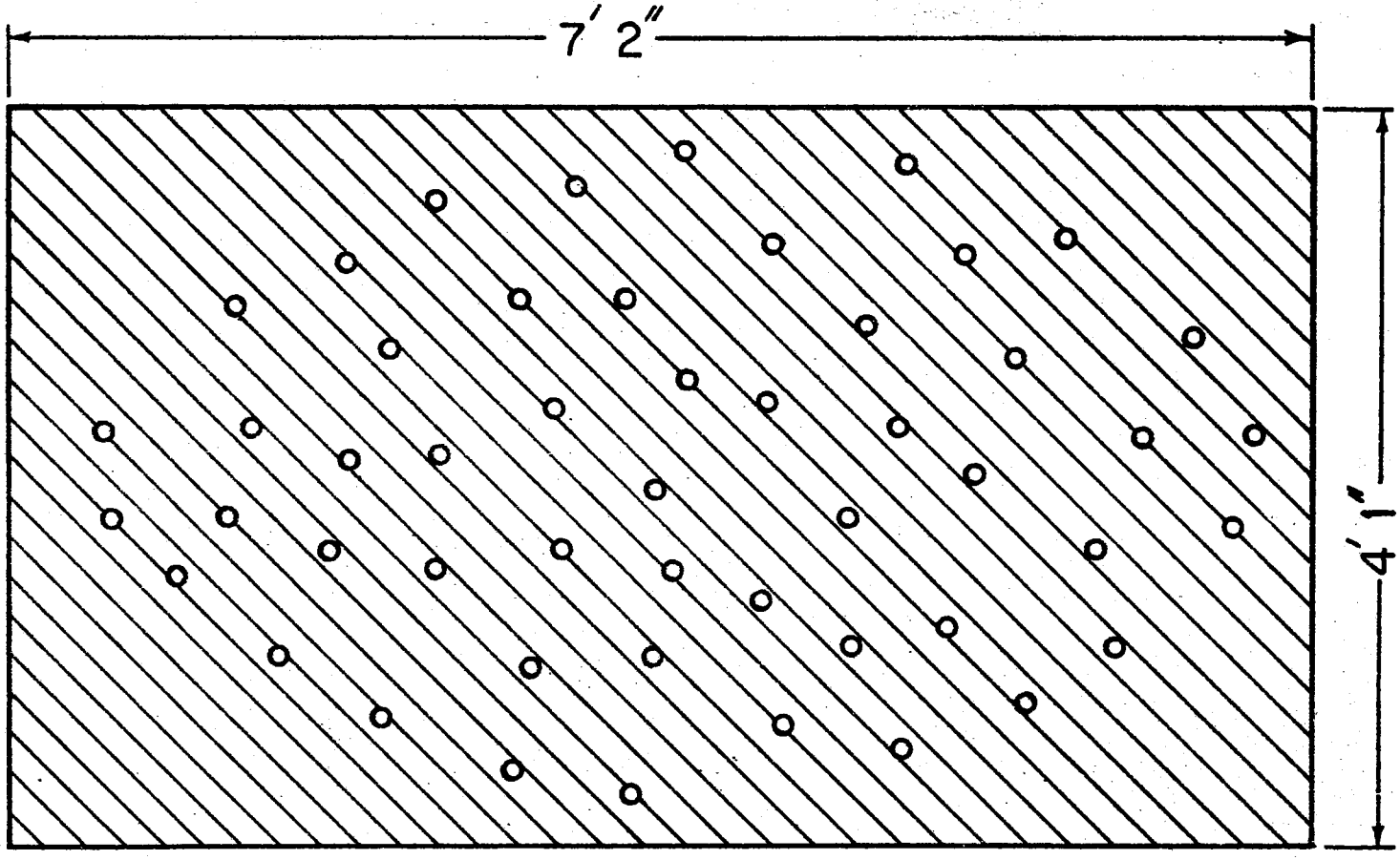

Fig. 6. Simulation of a target as projected on screen for viewing. Small circles indicate points of light on dark screen.

> in the partition up ahead of you, then the next person takes his turn. We will do this to make 15 targets, then the targets will be shuffled so you won't know whose targets you are judging, and the operator in back of the partition will will then present these for a very brief period of time on the screen you see to your right front. This screen will be swung outward, and the patterns will be shown from the back.
>
> Now let me demonstrate this for you once. I will shoot a couple of targets and show you how it works and then show you the patterns. [At this point E2 loads the gun, the rabbits are run across, and he fires at two targets. Then E2 says to E1] Let me see one of those targets I shot so I can show them the pattern here.

E2 went forward, a pre-prepared target was handed to him, one that had a heavy pattern of shot all over the paper. He took this back, showed it very briefly to the subjects through a plywood board with the oval hole in the middle and then said:

> When we show the patterns, all we are going to show you is the oval, the body portion of the rabbit. The tail, the head, and the legs will be cut off by this frame. Okay, are there any questions? [After answering any questions, E2 says] Maybe you are wondering why we make these patterns with a shotgun. Well, it's very simple and there are two reasons. Number one, this is the cheapest way we can do it. We compared the cost of doing it this way with the cost of having a draftsman make a great number of random patterns of dots and this is much cheaper and faster and easier. Number two, as we stated before during your orientation, we use a great number of teenaged subjects in these judgment situations, and we find that this type of situation keeps them interested and they participate quite eagerly in it. I am sure you will also have fun doing this since it is sort of a fun game. [E2 then asks, pointing to the confederate] Say, you've done this before, why don't you do it first?

Three Ss fired the course. Each shooter fired once at each of the five rabbit-silhouette targets as they moved into view, one at a time, in openings in the screen. Each shell contained approximately 100 fine pellets, the holes from which were not visible from the firing line, although Ss could see their impact on the paper targets. E1 changed the targets and readied the range each time for the next

shooter, announcing "okay" when it was safe for E2 to give the gun to the next S. When three Ss had fired, 15 "targets" were presented and all the members of the experimental group scored them aloud, in turn, immediately after each target was presented. Each target was presented for .8 sec. by a timer-controlled overhead projector located to one side of the firing range and operated by E1. Ss were able to remain seated and view the targets as they were projected, from behind, on a screen. The confederate gave his or her judgment first each time. Ss judged aloud, giving first their name and then their judgment, to the nearest five, of the number of shot holes (Figure 8). Judgments were recorded as given by E2.

The same procedure was repeated, with three Ss again shooting a total of 15 more targets and all Ss judging the targets.

Pinball Situation. A standard pinball machine had been modified for use in this judgment situation. The machine had been changed so that no scores were visible, and the "flippers" had been extended to make the game easier, i.e., it was very difficult to "lose" a ball. The machine was adjusted so that it automatically shut off after 50 "clicks," or one game. These games were supposedly tape recorded by E1 while they were being played, although in fact actual games had been pre-recorded for play-back.

Ss were escorted into the PB laboratory (Figure 3) and seated by E1 in a semi-circle on "tablet arm" chairs approximately 5' in front of the pinball machine. E1 sat in a chair behind a table holding the tape recorder, and E2 stood beside the pinball machine. E1 gave the following instructions:

> This is a regular pinball machine except that the flippers have been extended and it doesn't cost you anything to play it. [E2 demonstrates by playing one game] The machine shuts off automatically at a pre-set time. Notice that your score does not show on the machine. You will take turns playing the pinball machine while I record the games. I'll give each of you a letter, A, B, C, or D, and when I call out your letter it will be your turn to play the machine. [E1 assigns letters from left to right, beginning with the confederate.] At the end of 15 games we will stop and I will play back the tape, one game at a time. Your task will be to estimate the total number of clicks in a game. Are there any questions?

Ss took turns playing in a predetermined random order so that Ss probably would not remember who had played a specific game. After 15 games had been played, E1 stated:

> Now I will run the tape back to the beginning and play it back for you. At the end of each game, I'll stop the tape and you will judge the total number of clicks in each game. After I play the recording of a game, you will make your judgments in order from A to D. Give your name first and then your judgment of the total number of clicks, to the nearest five clicks. Are there any questions?

E1 played the tape, stopping the tape after each "game" so that Ss could judge the number of "clicks." Judgments were recorded by E2.

Following 15 judgments given by each S, 15 more games were played and once again judgments were made by Ss and recorded by E2.

Hexagonal Horizontal-Vertical Situation. A five minute dark adaptation period, with red light illumination, took place in the same room as that used for the general orientation and for dark adaptation for the AK. The task for the Ss in the Hex was to judge the distance between pairs of lights (Figures 1 & 2).

Following dark adaptation, Ss were led by E2 into the Hex laboratory and seated behind the table. In the laboratory, E2 stood in front of the table at which Ss were seated and gave the following instructions:

> Your task for this situation is to give the most accurate estimate possible of the distance between two points of light which will appear in the area in front of you. These points of light will appear at various angles and distances apart, and you should give your estimate to the nearest inch. These distances are programmed into the machine, and the machine to test your alertness occasionally may show you just one light or you may hear the warning click and not see any light. In these cases you should state aloud, one light or no light. Immediately after the two lights disappear, you should give in order, from your left to right, the most accurate estimate you can of the total distance between the lights. Give your first name first and then your estimate. You will have ample time between the presentation of the pairs of lights to give your estimates. Don't hurry, but give it quickly and promptly, immediately after the lights go out in order from left to right, giving your first name first before your estimate. [E2 then moves to the front of the room toward the Hex stimulus generator, saying as he does] You will have plenty of time to give your judgment between the light presentations. We will do it a couple of times for practice before we start in. I will now show you a pair of lights.

Thirty judgments were made, in turn, by the three Ss and the confederate, with the confederate making his or her judgment first each time. The data were recorded by E2 as given by the Ss.

CHAPTER IV

RESULTS

The data collected were in the form of judgments made by naive Ss in eight experimental groups of three Ss and one confederate (experimenter collaborator) each. A different confederate was used in each experimental group. Thirty judgments were made by each S in each of four different experimental judgment situations, the autokinetic (AK), the shotgun (SG), the pinball (PB), and the hexagonal horizontal-vertical (Hex). Participation in the situations was counterbalanced across groups, with the order of presentation chosen at random for a particular group (Table II).

The range of prescribed arbitrary judgments given by confederates in a particular judgment situation was the same for all experimental groups. In order to compare the judgment medians of Ss in the four situations, judgment medians were transformed in relation to the autokinetic situation judgments, making the assumption that the arbitrary ranges were comparable. This assumption was based on the fact that, in each situation, the arbitrary judgment range was located above and contingent to the previously established natural norm range. That is, a judgment of 12 inches, the lowest judgment made by confederates in the AK, was assumed to be equivalent to 125 shotholes, 90 clicks, and 28 inches, the lowest judgments made by confederates in the SG, PB, and Hex respectively (Table III).

In each situation a constant was subtracted from each judgment median. The constant subtracted for each situation was the difference between 12, the lowest judgment in the arbitrary range of the AK situation, and the lowest judgment in the arbitrary range of the particular situation. In other words, in the SG situation, 65 was subtracted from each judgment median because the lowest judgment in the arbitrary range was 65 units from the lowest judgment in the AK arbitrary range. By the same reasoning, 30 was subtracted from each judgment median in the PB situation and 4 was subtracted from each judgment median in the Hex situation.

Following the appropriate subtraction, judgment medians in the Hex situation were divided by two because arbitrary judgments were given by the confederate in units of two (i.e., to the nearest even inch). Judgment medians in the SG and PB situations were divided by five because judgments were given in units of five. Judgments in the AK situation were given to the nearest inch.

The comparative relationships derived in this way for the norm judgment units are shown by the formula

$$AK = \frac{SG - 65}{5} = \frac{PB - 30}{5} = \frac{Hex - 4}{2}.$$

The comparative judgment units in terms of inches of perceived movement (AK), estimated number of shotholes (SG), estimated inches between lights (Hex), and estimated number of clicks (PB) within arbitrary norms were presented in Chapter III (Table III).

The data, as transformed, were the medians of judgments made by Ss in each judgment situation. Transformed values of the medians are given in Table IV and Figure 7.

TABLE IV

TRANSFORMED MEDIAN VALUES FOR SUBJECTS

Group	Person	Treatment Medians			
		PB	SG	AK	Hex
	1	13.80	1.50	7.25	3.85
A	2	11.93	12.32	5.61	7.90
	3	18.17	25.00	14.17	6.50
	4	7.50	14.50	9.00	12.50
B	5	4.25	15.17	4.94	10.50
	6	2.90	14.95	4.95	10.14
	7	11.17	5.00	11.00	5.36
C	8	11.12	6.30	14.50	5.20
	9	11.50	7.25	13.50	5.92
	10	12.50	10.16	16.10	13.00
D	11	13.50	7.16	14.75	12.11
	12	13.00	9.33	15.30	13.17
	13	7.50	11.94	9.50	7.92
E	14	4.79	8.77	6.33	6.03
	15	5.33	8.17	8.00	5.75
	16	13.64	9.75	11.50	5.45
F	17	11.70	12.21	11.50	4.75
	18	16.00	12.50	15.35	6.63
	19	6.25	15.36	14.83	10.25
G	20	5.50	14.04	14.50	9.25
	21	5.06	12.88	13.50	8.95
	22	13.16	10.75	11.60	13.04
H	23	14.83	9.10	7.83	10.50
	24	16.36	11.25	10.36	13.05

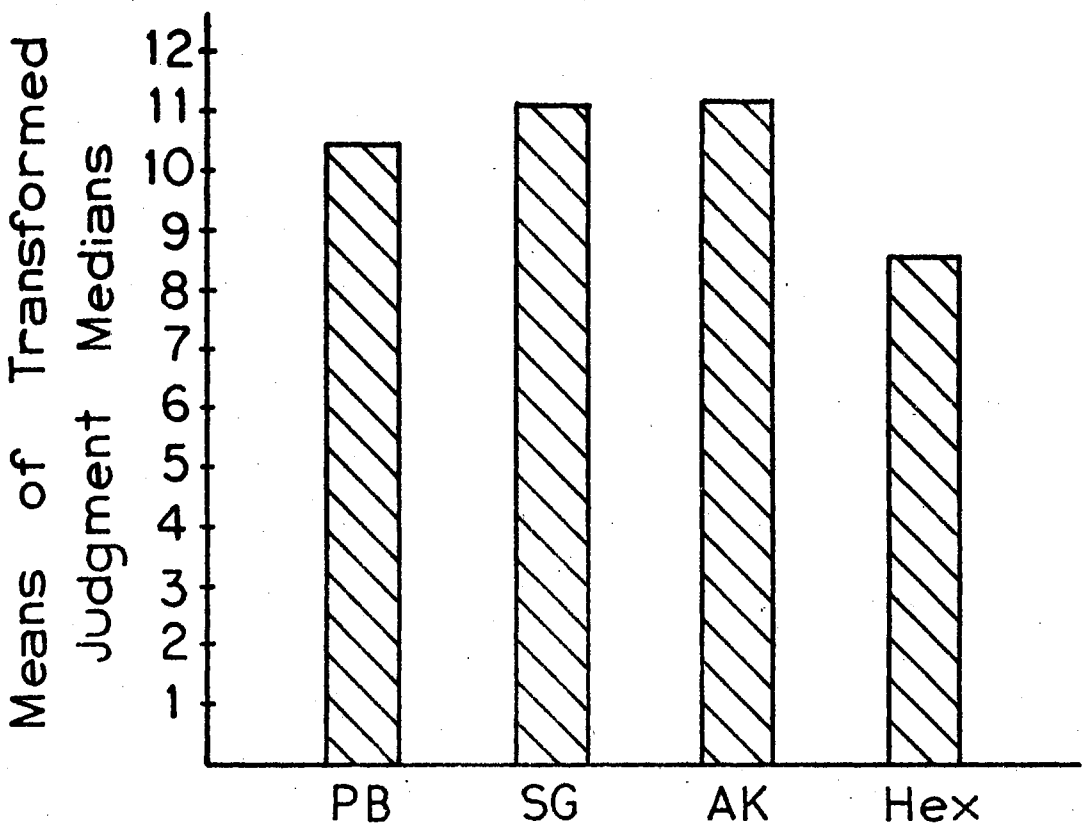

Fig. 7. Means of transformed judgment medians of eight experimental groups (three Ss, one confederate) in four experimental norm formation judgment situations. PB: pinball situation; SG: shotgun situation; AK: autokinetic situation; Hex: hexagonal horizontal-vertical situation.

Hypothesis 1 states that there is no difference across groups among the norms formed in a given judgment situation. The data were subjected to a two factor (groups/confederates and situations) analysis of variance with repeated measures on one factor (situations) (Winer, 1962). The results are shown in Table V. The analysis of variance shows that, using transformed medians of Ss' judgments, the main effects of factor A, groups/confederates, are not statistically significant ($F = 1.91$). Thus, hypothesis 1 was supported.

TABLE V

ANALYSIS OF VARIANCE OF JUDGMENT MEDIANS

Source	SS	df	MS	F
Between Ss	478.2074	23		
A (groups)	218.0454	7	31.1493	1.9157
Ss w/n groups	260.1620	16	16.2601	
Within Ss	1044.0323	72		
B (situations)	94.2743	3	31.4247	7.4844**
AB	748.2220	21	35.6296	8.4859**
B x Ss w/n groups	201.5360	48	4.1987	

** $p < .01$

Hypothesis 2 predicts that there is no difference, across judgment situations, among the group norms formed by the individuals in the experimental groups. The main effects of factor B, situations, are significant ($F = 7.84$, $p < .01$), as are the interaction of A x B, groups/confederates x situations ($F = 8.49$, $p < .01$).

The Newmann-Keuls method for repeated measures (Winer, 1962) was used to make individual comparisons across situations, i.e., levels of factor B. The test showed no differences among the situations except for the Hex. The Hex was significantly different from all other situations ($p < .05$). Hypothesis 2 was therefore supported except in regard to the Hex situation.

CHAPTER V

DISCUSSION

The presentation of moderately arbitrary norms, presented by a confederate to a majority of naive subjects, had an effect on subject judgments, specifiable in terms of judgment medians. Two hypotheses were tested. First, it was predicted that there would be no difference in emergent norms across experimental groups in a given judgment situation. Second, it was predicted that there would be no difference in emergent norms across judgment situations.

It was found that in each of the four experimental norm formation judgment situations a norm did emerge for each group and further that there were no significant differences, across groups, among the norms formed in a given situation. That is, for a given judgment situation the effect of the confederates' judgments was statistically similar across groups.

There was a difference, however, in the effects across situations. Further analysis revealed that there were no differences among the emergent norms in the autokinetic, the shotgun, and the pinball situations. The norms formed in the hexagonal horizontal-vertical situation, however, were significantly different from those of the other situations. Examination of the judgments in the hexagonal horizontal-vertical situation indicates the subject judgments in this situation were least affected by the distribution of judgments given by

confederates, i.e., in the hexagonal horizontal-vertical situation the groups failed to adopt the confederates' experimenter prescribed arbitrary norm to the same degree as they did in the other three situations.

Since the same confederate participated in all four situations with a given group, two explanations for this result seem possible. First the distribution of judgments given by the confederates in the hexagonal horizontal-vertical situation may have been unrealistically high for the conditions, i.e., the prescribed norm was too arbitrary to be acceptable (MacNeil, 1964). The method, however, for determining the appropriate moderately arbitrary norm used by the confederates was the same as that used for determining the other moderately arbitrary norms. In each case, the distribution of judgments given by the confederates was a range of judgments contingent to, but distinct from, the previously established natural norm for the situation under the specified conditions.

The second, more probable, explanation of the relative lack of effect of confederate judgments in the hexagonal horizontal-vertical situation is related to the degree of structure in the situation. The emergent norms indicate a narrow range of judgments, i.e., a lack of judgment variability. This low variability points to a relatively high degree of structure, i.e., a lack of perceived alternatives in the physical stimulus being judged.

In our culture, where short distances are measured in terms of inches and feet, certain measurements such as one foot (12 inches) become cultural anchors for an individual who is making distance estimates. That is, an individual tends to have an internal experiential

standard against which he judges other distances. In other research with the hexagonal horizontal-vertical situation, for example, subjects frequently reported "thinking of" a foot and comparing that with the distance to be estimated (Gregory, 1972). When distances to be judged are at, or near, a culturally relevant social anchor, judgments of this distance tend to be less variable. It is possible, therefore, that a 15 inch actual distance is too near the "one foot" anchor, thereby reducing judgment variability. In addition to the English foot reference scale there is also a cultural scale related to the decimal system. Although this internal reference scale is apparently less weighty than the "foot" scale when estimations of short distances are made, there is a tendency for estimations to pile up at the 10, 15, etc., points. The combined effect of these anchors, 10, 12, and 15 inches, results in a tendency for judgments to regress toward the anchorages. They thus provide a highly compelling judgment range which restricts variability.

Another factor probably resulting in less judgment variability is that subjects are generally able to judge short distances more accurately than long distances. A 15 inch actual distance between lights in the hexagonal horizontal-vertical situation is probably so short that subjects can make estimates which are somewhat accurate, i.e., within three or four inches, and therefore the judgments tend to cluster in the vicinity of the veridical distance and are less variable than judgments of a greater actual distance would be. This consideration of the relationship of greater distance and variability of judgments would be a logical extrapolation of the relationship of increase of numerosity and judgments as reported by Kaufman, Lord, Reese,

and Volkmann (1949).

It is also possible that the 30 second interval between stimulus presentations was too brief. In the Sherif (1935) studies 60 second intervals between presentations of the autokinetic stimulus light was standard. It is possible that the shorter 30 second interval in the present instance permitted too great a residual basis for comparison from one stimulus presentation to the next, narrowing the variability in the range of perceived distances. Thus, the interval used may have further increased the apparent structure and led to a decrease in variability and consequently a subjectively perceived judgment range relatively resistant to the confederate presented alternatives.

The four judgment situations--the autokinetic, the shotgun, the pinball, and the hexagonal horizontal-vertical--were designed to be not highly structured in terms of the physical aspects of the stimulus. There are therefore many perceptual alternatives available to participants both across trials and among individuals in a given trial. In the autokinetic situation there is no "correct" answer to amount of movement, since the light does not actually move. In the other three situations the context is ambiguous; "correct" answers could be given but participants are not provided with enough information to establish these answers.

There is a kind of reality, however, in each of the judgment situations under consideration. Participants do not give random guesses but give, rather, a determinable range of judgments specifiable in terms of both focus and variability. In each judgment situation, for a specified set of conditions, a natural, non-arbitrary, norm can be established which, without experimenter manipulation, is more or less

consistent across individuals and for a given individual over time. With appropriate experimenter manipulation such as experimenter suggestion or the use of confederates, other norms, not natural for the situation, may emerge. These norms can vary in degree of arbitrariness, or unreality, in relation to the natural norm for the conditions.

Because of the "reality" factor mentioned above, however, the degree of arbitrariness which may be imposed on naive subjects varies with the relative amount of physical structure present in the situation. The hexagonal horizontal-vertical situation as used in this study is apparently too highly structured in its physical, and related temporal, aspects to allow the imposition of the arbitrary norm to the same degree as in the other situations when the confederate/naive ratio is one to three, i.e., when the social pressure to deviate from the natural range is low.

Implications for Future Research

To utilize the four experimental norm formation judgment situations in future research the judgments made by subjects in these situations must be comparable under conditions of low social pressure. It is apparent that the hexagonal horizontal-vertical judgment situation must be modified so that it can be used in conjunction with the other situations. Since the problem with the hexagonal horizontal-vertical situation appears to result from a relative lack of ambiguity in the situation, the distance between light pairs should be increased, thus hopefully increasing judgment variability. This tactic, in reverse, was successful in the shotgun and pinball situations, where judgment variability was reduced in both cases by a reduction of

"shot holes" and "clicks," respectively, per judgment trial. In addition, the interval between stimulus presentations in the hexagonal horizontal-vertical situation should be lengthened to reduce the ease of stimulus comparison across trials with a probable consequent increase in variability. Although educated guesses as to the amount of correction regarding the effect of varying degrees of increase of structure are possible, it is not possible to predict, exactly, the relationships at this time. A priori corrections are not feasible and trial and error investigation is the means available at present.

In order to study group factors with some hope of valid generalization, groups differing in age, sex, and cultural, socio-economic and educational backgrounds should be investigated. For this reason norm formation judgment situations appropriate for specific segments of the general population must be developed. For example, although the shotgun judgment situation has been used with female college students, it, the shotgun situation, is more appealing to teenaged boys. Therefore, efforts are being made to develop judgment situations more appropriate for teenaged girls. A "jukebox" judgment situation, in which subjects choose records on a jukebox and listen to them, is in the pretest stage. The records are standard "popular" selections with series of audible "beeps" embedded in the music. The subjects' task is to estimate the total number of beeps on a given musical selection. This judgment situation, although developed for use especially for teenaged girls, should be interesting to males as well.

The systematic introduction of arbitrary norms to social units has traditionally been performed in relatively sterile laboratory settings. With the introduction of the method used in this study for

comparing the relative effects of the judgments of one (or more) individual(s) in different judgment situations, it becomes feasible to develop judgment situations "in the field," i.e., in a more natural social setting. Comparable situations can be developed in which natural and arbitrary norms are related to unique activities in an environment more familiar to the participants than that of the typical laboratory.

Past research has explored the outer limits of conformity and compliance to arbitrary norms in experimental norm formation judgment situations (Allen & MacNeil, 1969; Jacobs & Campbell, 1961; MacNeil, 1964). MacNeil (1967), in studying status position power factors in informal social groups, indoctrinated group members, of specified status positions, with arbitrary norms in the autokinetic and shotgun judgment situations and measured the subsequent effect of these members' judgments on the judgments of the other group members. The arbitrary norms MacNeil used were above and contingent to the judgment ranges natural for the conditions. In addition, four experimenter confederates were used for the indoctrination sessions (a one to four naive to confederate ratio). The results of the present study imply that judgment norm ranges that are less arbitrary than used in the past might be used, with the effects still measurable and yet with a resultant lower level of stress among natural group members. Moreover, arbitrary norms might be introduced to selected group members in a more subtle fashion, e.g., with fewer confederates.

Summary

Four experimental norm formation judgment situations were investigated. The comparability of emergent norms in each of the situations was the focus of the study. The principal experimental factor held constant in the judgment situations was a moderately arbitrary prescribed norm, presented with a low degree of social pressure. Eight experimental groups of four members each were used. One member of each group was a confederate (experimenter collaborator). Four of the groups consisted of males and four of females. Each group participated, in turn, in each of the four situations. The four situations compared included the autokinetic, the shotgun, the pinball, and the hexagonal horizontal-vertical judgment situations.

It was determined that the norms formed in three of the situations were equivalent in terms of the effect of a moderate level of arbitrariness presented under a low order of social pressure. The effect was measured in terms of judgment medians given by the naive subjects in each group. The norms emerging in the hexagonal horizontal-vertical situation could not be considered equivalent to those norms which emerged in the other situations. The lack of comparability of the hexagonal horizontal-vertical situation is attributed to a relatively greater degree of structure, i.e., lack of ambiguity, resulting from psychophysical and cultural anchorages.

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APPENDIX A

FREQUENCY DISTRIBUTIONS OF SUBJECT JUDGMENTS, BY EXPERIMENTAL GROUPS, IN PINBALL JUDGMENT SITUATION

ARBITRARY RANGE: 90 - 120 CLICKS

		Group A			Group B		
X	(Clicks)	S1	S2	S3	S4	S5	S6
25		0	0	0	1	0	0
30		0	0	0	2	0	3
35		0	0	0	0	1	3
40		0	0	0	1	5	6
45		0	0	0	0	3	5
50		1	0	0	2	8	4
55		0	0	0	1	6	5
60		2	0	0	4	5	1
65		0	1	0	3	1	2
70		3	3	0	2	1	0
75		0	2	0	1	0	0
80		1	4	0	6	0	0
85		1	2	0	2	0	0
90		2	7	0	2	0	0
95		2	0	0	0	0	0
100		10	6	4	1	0	0
105		4	1	1	1	0	0
110		1	2	5	0	0	0
115		2	0	1	0	0	0
120		1	1	6	0	0	0
125		0	0	1	0	0	0
130		0	0	4	0	0	0
135		0	0	0	0	0	0
140		0	0	3	0	0	0
145		0	0	1	0	0	0
150		0	1	1	0	0	0
155		0	0	1	0	0	0
160		0	0	0	0	0	0
165		0	0	0	0	0	0
170		0	0	1	0	0	0
175		0	0	0	0	0	0
180		0	0	1	0	0	0

		Group C			Group D		
X	(Clicks)	S7	S8	S9	S10	S11	S12
65		0	2	2	0	0	0
70		0	3	2	0	0	0
75		6	1	4	2	0	0
80		7	1	3	0	2	5
85		3	13	4	5	4	3
90		5	4	3	8	5	3
95		1	3	4	2	5	8
100		8	1	6	6	4	4
105		0	1	0	1	4	3
110		0	0	0	3	6	1
115		0	1	0	1	0	2
120		0	0	2	0	0	1
125		0	0	0	1	0	0
130		0	0	0	0	0	0
135		0	0	0	0	0	0
140		0	0	0	0	0	0
145		0	0	0	0	0	0
150		0	0	0	1	0	0

		Group E			Group F		
X	(Clicks)	S13	S14	S15	S16	S17	S18
45		0	2	0	0	0	0
50		4	11	10	0	1	0
55		3	7	6	0	0	1
60		6	3	7	0	0	0
65		2	3	1	0	1	0
70		1	3	3	2	1	0
75		3	0	3	1	4	0
80		4	0	0	5	5	0
85		1	0	0	3	2	1
90		3	0	0	1	5	6
95		0	0	0	2	3	1
100		1	0	0	7	6	3
105		1	1	0	2	0	1
110		0	0	0	1	1	6
115		1	0	0	3	1	3
120		0	0	0	3	0	2
125		0	0	0	0	0	1
130		0	0	0	0	0	3
135		0	0	0	0	0	0
140		0	0	0	0	0	1
145		0	0	0	0	0	0
150		0	0	0	0	0	1

		Group G			Group H		
X	(Clicks	S19	S20	S21	S22	S23	S24
40		0	1	3	0	0	0
45		5	2	5	0	0	0
50		2	4	2	1	0	0
55		5	8	9	0	0	0
60		4	6	7	0	0	1
65		3	2	0	0	0	0
70		3	0	2	1	2	0
75		4	3	2	0	1	0
80		2	3	0	2	0	0
85		1	1	0	0	2	0
90		1	0	0	7	2	2
95		0	0	0	6	4	6
100		0	0	0	5	3	7
105		0	0	0	4	3	3
110		0	0	0	3	7	7
115		0	0	0	0	4	1
120		0	0	0	1	1	3
125		0	0	0	0	1	0

APPENDIX B

FREQUENCY DISTRIBUTIONS OF SUBJECT JUDGMENTS, BY EXPERIMENTAL GROUPS, IN SHOTGUN JUDGMENT SITUATION

ARBITRARY RANGE: 125 - 155 SHOTHOLES

		Group A			Group B		
X	(Shotholes)	S1	S2	S3	S4	S5	S6
45		1	0	0	0	0	0
50		3	0	0	0	0	0
55		0	0	0	0	0	0
60		5	0	0	0	0	0
65		2	0	0	0	0	0
70		4	0	0	0	0	0
75		3	0	0	0	0	0
80		4	0	0	0	0	0
85		1	0	0	0	0	0
90		2	1	0	0	0	0
95		0	0	0	0	0	0
100		3	2	1	1	0	0
105		0	0	0	0	0	0
110		1	3	2	2	0	0
115		0	0	0	0	0	0
120		0	0	2	2	0	0
125		0	11	0	1	2	1
130		0	0	1	4	5	3
135		0	0	1	5	2	6
140		0	0	0	2	9	11
145		0	0	0	9	2	3
150		1	12	3	4	6	3
155		0	0	0	0	2	3
160		0	0	3	0	0	0
165		0	0	0	0	0	0
170		0	0	0	0	0	0
175		0	1	0	0	1	0
180		0	0	4	0	0	0
185		0	0	0	0	0	0
190		0	0	3	0	0	0
195		0	0	0	0	0	0
200		0	0	2	0	1	0

		Group A			Group B		
X	(Shotholes)	S1	S2	S3	S4	S5	S6
205		0	0	0	0	0	0
210		0	0	2	0	0	0
215		0	0	0	0	0	0
220		0	0	1	0	0	0
225		0	0	0	0	0	0
230		0	0	0	0	0	0
235		0	0	0	0	0	0
240		0	0	0	0	0	0
245		0	0	0	0	0	0
250		0	0	2	0	0	0
255		0	0	0	0	0	0
260		0	0	0	0	0	0
265		0	0	0	0	0	0
270		0	0	1	0	0	0
275		0	0	1	0	0	0
280		0	0	0	0	0	0
285		0	0	0	0	0	0
290		0	0	0	0	0	0
295		0	0	0	0	0	0
300		0	0	0	0	0	0
305		0	0	0	0	0	0
310		0	0	0	0	0	0
315		0	0	0	0	0	0
320		0	0	1	0	0	0

		Group C			Group D		
X	(Shotholes)	S7	S8	S9	S10	S11	S12
50		2	0	0	0	0	0
55		0	0	0	0	0	0
60		1	0	0	0	0	0
65		0	0	0	0	0	0
70		1	0	0	0	0	0
75		6	3	1	0	0	0
80		3	4	1	0	2	0
85		0	1	0	0	1	0
90		4	3	6	2	1	0
95		2	5	1	1	7	3
100		5	2	8	4	6	3
105		0	3	0	4	5	4
110		2	4	5	0	5	6
115		0	4	0	6	3	3
120		0	1	4	5	0	4
125		1	0	1	3	0	3
130		2	0	3	4	0	4
135		0	0	0	0	0	0
140		0	0	0	1	0	0
145		0	0	0	0	0	0
150		1	0	0	0	0	0

		Group E			Group F		
X	(Shotholes)	S13	S14	S15	S16	S17	S18
75		0	0	0	1	0	0
80		0	0	0	0	0	0
85		0	0	0	0	0	0
90		0	1	2	0	0	0
95		0	0	3	4	0	1
100		1	6	6	5	0	3
105		0	7	6	1	0	0
110		1	6	11	3	2	0
115		0	7	1	4	2	2
120		9	3	1	5	6	6
125		9	0	0	4	7	3
130		9	0	0	2	5	5
135		0	0	0	1	0	1
140		1	0	0	0	2	2
145		0	0	0	0	0	3
150		0	0	0	0	5	2
155		0	0	0	0	0	0
160		0	0	0	0	0	1
165		0	0	0	0	0	0
170		0	0	0	0	1	1

		Group G			Group H		
X	(Shotholes)	S19	S20	S21	S22	S23	S24
90		0	0	0	2	1	1
95		0	0	0	0	3	1
100		0	1	0	3	3	3
105		0	0	0	1	5	1
110		0	0	1	2	5	4
115		0	0	0	6	5	2
120		1	0	2	4	6	4
125		1	4	5	4	1	1
130		3	6	12	2	1	4
135		4	7	7	3	0	3
140		7	6	3	2	0	6
145		4	5	0	0	0	0
150		5	1	0	1	0	0
155		2	0	0	0	0	0
160		2	0	0	0	0	0
165		0	0	0	0	0	0
170		0	0	0	0	0	0
175		0	0	0	0	0	0
180		0	0	0	0	0	0
185		0	0	0	0	0	0
190		0	0	0	0	0	0
195		0	0	0	0	0	0
200		0	0	0	0	0	0
205		0	0	0	0	0	0
210		0	0	0	0	0	0
215		0	0	0	0	0	0
220		0	0	0	0	0	0
225		0	0	0	0	0	0
230		0	0	0	0	0	0
235		0	0	0	0	0	0
240		0	0	0	0	0	0
245		0	0	0	0	0	0
250		0	0	0	0	0	0
255		0	0	0	0	0	0
260		0	0	0	0	0	0
265		0	0	0	0	0	0
270		0	0	0	0	0	0
275		1	0	0	0	0	0

APPENDIX C

FREQUENCY DISTRIBUTIONS OF SUBJECT JUDGMENTS, BY EXPERIMENTAL GROUPS, IN AUTOKINETIC JUDGMENT SITUATION

ARBITRARY RANGE: 12-18 INCHES

		Group A			Group B		
X	(Inches)	S1	S2	S3	S4	S5	S6
0		0	0	0	1	1	0
1		0	1	0	1	1	0
2		2	2	0	0	0	2
3		2	4	0	1	2	5
4		1	3	0	1	7	3
5		3	4	0	3	9	11
6		4	9	0	2	7	7
7		4	1	0	1	3	2
8		4	1	0	4	0	0
9		3	2	1	2	0	0
10		1	2	2	6	0	0
11		2	0	1	0	0	0
12		1	1	4	3	0	0
13		2	0	5	0	0	0
14		0	0	3	2	0	0
15		0	0	2	3	0	0
16		1	0	2	0	0	0
17		0	0	1	0	0	0
18		0	0	3	0	0	0
19		0	0	3	0	0	0
20		0	0	1	0	0	0
21		0	0	0	0	0	0
22		0	0	0	0	0	0
23		0	0	1	0	0	0
24		0	0	1	0	0	0

		Group C			Group D		
X	(Inches)	S7	S8	S9	S10	S11	S12
4		0	1	0	0	0	0
5		0	0	0	0	0	0
6		0	1	0	0	0	0
7		0	0	0	0	0	0
8		4	1	1	0	0	0
9		0	1	0	0	0	0
10		11	3	5	0	0	0
11		0	0	0	0	0	0
12		12	0	8	5	4	1
13		0	0	1	3	5	0
14		1	8	4	2	5	10
15		2	3	3	2	4	5
16		0	4	7	5	3	3
17		0	0	0	2	5	0
18		0	4	1	5	3	10
19		0	0	0	0	1	0
20		0	2	0	5	0	1
21		0	0	0	0	0	0
22		0	1	0	1	0	0
23		0	0	0	0	0	0
24		0	0	0	0	0	0
25		0	0	0	0	0	0
26		0	0	0	0	0	0
27		0	0	0	0	0	0
28		0	1	0	0	0	0

		Group E			Group F		
X	(Inches)	S13	S14	S15	S16	S17	S18
3		0	1	2	0	0	0
4		0	5	6	0	0	0
5		0	4	2	2	0	0
6		1	6	4	0	1	0
7		1	1	0	2	3	0
8		7	6	2	2	3	1
9		6	1	4	0	1	1
10		4	4	3	8	5	3
11		3	1	0	1	2	0
12		3	1	4	4	3	3
13		2	0	0	3	3	1
14		2	0	3	1	1	0
15		0	0	0	5	5	7
16		0	0	0	0	0	2
17		0	0	0	0	1	1
18		1	0	0	1	2	6
19		0	0	0	1	0	0
20		0	0	0	0	0	3
21		0	0	0	0	0	0
22		0	0	0	0	0	0
23		0	0	0	0	0	2

		Group G			Group H		
X	(Inches)	S19	S20	S21	S22	S23	S24
4		0	0	0	0	1	0
5		0	0	0	3	3	0
6		0	0	0	1	4	2
7		0	0	0	3	5	0
8		0	0	0	1	6	7
9		0	1	0	2	5	0
10		2	0	5	4	5	7
11		4	0	1	0	0	2
12		3	5	5	10	1	7
13		3	6	4	1	0	0
14		2	3	3	2	0	4
15		3	4	4	1	0	0
16		1	3	4	1	0	1
17		1	2	4	0	0	0
18		4	1	0	0	0	0
19		3	0	0	0	0	0
20		3	4	0	1	0	0
21		0	0	0	0	0	0
22		0	0	0	0	0	0
23		1	0	0	0	0	0
24		0	1	0	0	0	0

APPENDIX D

FREQUENCY DISTRIBUTIONS OF SUBJECT JUDGMENTS, BY EXPERIMENTAL GROUPS, IN HEXAGONAL HORIZONTAL-VERTICAL JUDGMENT SITUATION

ARBITRARY RANGE: 28 - 40 INCHES

		Group A			Group B		
X	(Inches)	S1	S2	S3	S4	S5	S6
6		1	0	0	0	0	0
7		0	0	0	0	0	0
8		5	0	0	0	0	0
9		6	0	0	0	0	0
10		2	0	0	0	0	0
11		0	0	0	0	0	0
12		5	0	2	0	0	0
13		7	0	2	0	0	0
14		4	4	4	0	0	0
15		0	0	0	0	0	0
16		0	3	4	0	0	0
17		0	0	6	0	0	0
18		0	6	6	1	0	2
19		0	0	1	0	0	0
20		0	7	1	1	7	6
21		0	0	2	0	0	0
22		0	0	0	0	0	3
23		0	0	1	0	0	0
24		0	8	0	5	8	7
25		0	0	0	1	0	1
26		0	2	0	1	2	5
27		0	0	1	0	0	0
28		0	0	0	6	3	1
29		0	0	0	0	1	0
30		0	0	0	10	7	5
31		0	0	0	0	0	0
32		0	0	0	2	1	0
33		0	0	0	0	0	0
34		0	0	0	0	0	0
35		0	0	0	1	0	0
36		0	0	0	2	1	0

		Group C			Group D		
X	(Inches)	S7	S8	S9	S10	S11	S12
10		5	0	2	0	0	0
11		0	0	0	0	0	0
12		8	4	5	0	0	0
13		0	2	0	0	0	0
14		0	10	4	0	0	0
15		9	3	2	0	0	0
16		1	3	6	0	0	0
17		0	1	2	0	0	0
18		1	1	4	0	0	1
19		0	0	1	0	0	0
20		3	1	3	0	0	0
21		0	2	0	0	0	0
22		1	2	1	1	2	0
23		0	0	0	1	0	0
24		0	1	0	3	1	1
25		0	0	0	1	0	1
26		0	0	0	2	3	1
27		0	0	0	0	4	1
28		0	0	0	4	7	5
29		0	0	0	1	3	0
30		2	0	0	4	3	6
31		0	0	0	0	0	0
32		0	0	0	4	6	5
33		0	0	0	1	0	0
34		0	0	0	6	0	7
35		0	0	0	0	0	0
36		0	0	0	0	0	2
37		0	0	0	0	0	0
38		0	0	0	2	1	0

		Group E			Group F		
X	(Inches)	S13	S14	S15	S16	S17	S18
10		0	0	0	4	5	0
11		0	0	0	0	0	0
12		1	0	0	6	4	1
13		4	0	0	0	6	0
14		0	4	3	1	3	0
15		2	6	12	10	7	7
16		0	9	2	5	2	1
17		0	5	3	1	2	0
18		6	4	8	3	1	8
19		0	0	2	0	0	0
20		6	1	0	0	0	7
21		0	0	0	0	0	0
22		1	1	0	0	0	0
23		0	0	0	0	0	0
24		0	0	0	0	0	3
25		4	0	0	0	0	0
26		0	0	0	0	0	2
27		0	0	0	0	0	0
28		2	0	0	0	0	1
29		0	0	0	0	0	0
30		3	0	0	0	0	0
31		0	0	0	0	0	0
32		1	0	0	0	0	0

		Group G			Group H		
X	(Inches)	S19	S20	S21	S22	S23	S24
15		0	1	1	0	0	0
16		0	0	3	0	0	0
17		0	0	0	0	0	0
18		0	1	1	0	0	0
19		1	0	1	0	0	0
20		2	10	6	0	4	0
21		0	0	3	0	0	0
22		7	3	5	0	4	2
23		1	1	6	0	1	0
24		4	11	4	6	6	2
25		3	1	0	0	0	0
26		4	1	0	0	2	3
27		3	0	0	0	1	0
28		3	0	0	4	4	5
29		0	0	0	1	0	0
30		2	1	0	7	5	5
31		0	0	0	0	0	0
32		0	0	0	2	3	6
33		0	0	0	0	0	0
34		0	0	0	1	0	5
35		0	0	0	0	0	0
36		0	0	0	6	0	1
37		0	0	0	0	0	0
38		0	0	0	1	0	1
39		0	0	0	0	0	0
40		0	0	0	2	0	0

VITA

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