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FREQUENCY OF CONTIGUITY AND ATTITUDE CHANGE

by
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of the requirements for the degree of
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ABSTRACT

An understanding of change in attitude as a concomitant of learning is important to educational practice. This study hypothesized that, during the process of formation of affective associations of positive, neutral, and negative value, frequency of exposure would influence in a more favorable direction the rated "goodness" of these associations. The associated stimuli, a Chinese character (CS) and an adjective (UCS) paired in a classical conditioning paradigm, served as the learning task for Ss in two experiments. The frequency of exposure varied over four treatment categories at rates of 1, 3, 9, and 27 presentations of the CS and UCS contiguously. The results indicated that there was an enhancement effect operative with indifferent success. The differences between means failed to become significant at a recombination of the two rates of exposure (1 and 3 presentations) into a category designated "High". By inspection the curves for the combined data appeared to have parallel slopes which increased in a positive direction. The test of the hypothesis for row effects was significant. This led to the conclusion that affective associations though differing in a linear trend from one level to another did not receive significantly higher ratings of "goodness" at higher frequencies of exposure in the two experiments reported.

The theoretical background to the study included a reformulation of attitude structure in terms of belief and a mediational response equated with the evaluative aspect of attitude. Further impetus to the inception of the study came from a consideration of the research on the relationship between frequency, word value, and visual recognition threshold. Under high rates of exposure previous research had demonstrated correlations between lower visual recognition thresholds and higher ratings of words in terms of "goodness", as well as between ratings of "goodness" and word usage.

A form of classical conditioning, *voluntary instructed conditioning*, served as a model for the arrangement of the experiment. There were twelve Chinese characters and twelve adjectives of known affective values paired in every possible combination. Each Chinese character appeared under every treatment and affective level in Experiment 1. In Experiment 2 the characters, randomly assigned to two groups, appeared at alternating rates of exposure with the adjectives constituting the CSs under every condition.

The two-way analysis of variance repeatedly attained significant overall F ratios for row (affective value) effects at the .01 level of significance. The results of the analysis did not permit the rejection of no column or interaction effects. Differences in mean "goodness" ratings between low and high rates of exposures failed to attain significance at any level.

The interpretation of the results stressed the probable importance of stimulus familiarization and memory storage as explanations for the phenomena observed. The implications of the research called attention to the need for a reconsideration of the techniques involved in isolating the phenomenon, and suggested additional methods for its investigation.

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The remaining members of the committee, Professors Johnson and Carpenter, gave wholeheartedly of their knowledge of practical techniques and relevant materials during the realization of this study. These prefatory remarks acknowledge their assistance, too.

No expression of gratitude would be complete without the inclusion by name of Paul Wagner, who prepared the stimulus characters; Mrs. Mabelle Hsueh, who duplicated the materials; Mrs. Kathleen Farrell, who typed the final draft; and, anonymously, of those friends who helped in many various ways.

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CHAPTER ONE

INTRODUCTION

"What people loved they repeated; what people repeated they loved" (Dupee, 1965). This quotation neatly summarizes Gertrude Stein's artistic credo and at the same time introduces the focal point of this study: the relationship of frequency and affect to attitude change. Her style incorporated the simple, artfully reiterated; and to her admirers the verbal repetition must have sounded as pleasing as the abstruse neologisms of Joyce (Miller, 1952) must have sounded to his. Whether she ever considered the two variables to be of differential importance may be of slight consequence to her readers; but to those who see this interaction as a clue to an understanding of some forms of human behavior, its analysis assumes greater relevancy. This dissertation examines, in the light of recent experimentation, the outcome of juxtaposing emotionally-toned words and exotic stimuli and weighs the contribution each variable makes in relation to the change of affective associations.

The study of attitudes has received a great deal of attention since the early work of Thomas and Znaniecki, who described the topic as the most salient in social psychology. As contributions to the literature have proliferated, so have definitions as to what an attitude is. The list has proved to be extensive (Allport, 1954). Nevertheless the immediate utility of the concept has delayed efforts to demonstrate the processes that entered into its formulation. A great deal of research

has centered upon the measurement and description of attitudes already formed and operative, or on the methods whereby one changes them. One team of investigators (Sherif and Hovland, 1961) exhorted future research to examine attitudes in the light of the psychological processes involved, maintaining that "there was a particular need to explore in depth those principles which govern an individual's evaluation and those factors which influence their modification" (p.3). Other psychologists (Katz and Stotland, 1963) have suggested a need for general statements which explain the effect of given variables upon certain types of psychological functioning. If such a call to action is to result in an increment in the amount of knowledge related to the acquisition of attitudes, an objective demonstration should encompass a rationale and methodology appropriate to the task. This dissertation construes recent developments in learning theory, especially human verbal learning, and perception as providing suitable guidelines for the initial implementation of these remarks.

It is a valuable scientific procedure to circumscribe a complex phenomenon and then to reduce it to basic elements by analysis. Freud regularly used this method (Plutchnik, 1962). Once there is sufficient understanding of the basic components the investigators can recombine them to comprehend the qualitative differences peculiar to the observed fact or event. One recent publication (Zajonc, 1965) which suggests such an approach entertains a frequency of exposure hypothesis: that mere repeated exposure of a stimulus enhances the feelings of individuals toward it. The hypothesis postulates that not only will positive evaluative responses to stimuli increase in intensity under exposures of greater

frequency, but that, further, a similar heightening effect should eventuate for all evaluative responses to stimuli under like conditions.

The experiments reported have made use of a design similar to that used in classical conditioning, wherein the S associates conditioned stimulus with an unconditioned stimulus, in this instance a nonverbal character with an affectively-weighted word, under different rates of exposure. The results have permitted general statements about the influence of frequency of exposure on the intensity of elicited attitudes toward such stimuli.

Prior to the description of the experiments and a discussion of the results obtained, there is a need to consider in more precise detail the background research which anticipates or contributes to the rationale of this study. Through a consideration of the pertinent evidence the nature of the problem should become clearer and its implications more obvious.

CHAPTER TWO

THEORY

The emphasis which certain theoretical formulations (Peak, 1962; Rosenberg, 1956; Osgood, 1957; Krech, Crutchfield, and Ballachey, 1962) lend to such dimensions of attitude structure as the motivational, the cognitive, the emotional, and the perceptual may be a consequence more of a predisposition inherent in the system than of any sharp disagreement over their relative importance. That a new orientation can afford fresh insight into structural functions of an attitude without seriously negating other viewpoints is evident in the recent proposals of Fishbein (1961, 1963). He has urged a consideration of the concept under the dimensions of evaluation (emotion) and belief (cognition, motivation, and perception).

The theory hypothesizes that, during the conceptualization of an object, the individual makes a mediating response to it. This response can be highly evaluative, as Osgood (1957) has demonstrated by means of factor analyses of semantic-differential scales. For example, painful stimulation and the word *bad* could occur together as an instance of first-order conditioning (Staats and Staats, 1963). *Bad* itself should subsequently elicit a response which is an unspecifiable portion of the original reaction to physical pain. The habit strength of this mediating response would be a function of its repeated elicitation upon exposure of the stimulus object. Habit strength refers to the probability of the elicitation of the response and does not specify how much of the emotional

component is evoked. On any subsequent occasion the presentation of the stimulus *bad* should elicit this mediating response. There is considerable doubt as to what, if any, changes occur in the emotional component under conditions of repeated elicitation. The assumption hitherto has been that there is no change.

Beliefs about the existence, the description, the instrumental value, and the relationship of one stimulus object to another can develop during the conditioning phase. Most beliefs, Fishbein writes, are probabilistic: one can conceive of the possibility, likelihood, truth, and being of an object; and these beliefs are related to the evaluation made of the object (1963, p. 233).

By consensual definition an attitude is mainly an evaluative response. Fishbein equates the evaluative mediating response with the evaluative aspect of attitude. The overt measurement of this response is the operational equivalent of the manifestation of an attitude.

Therefore at the level of first-order conditioning an attitude is an evaluative belief, a judgment in terms of pain or pleasure that belief in the object's existence affords. On the level of second-order conditioning an attitude is an evaluative judgment which includes, not only the lower level, but also assumes a relationship between the object and other stimuli.

Frequency of contiguity

There is considerable agreement that the acquisition of most attitudes is a species of learned behavior (Campbell, 1963). Human learning suggests evidence germane to the modification of behavior and thus by analogy to attitude formation.

The fundamental assumption in conditioning is that it occurs in some way by contiguity. Ever since Smith and Guthrie proposed conditioning, by which they meant the simultaneous or near simultaneous occurrence of a neural stimulus and a response, as a substitute for association, this formula has served as an important principle of learning. It is best exemplified in the classical conditioning experiment (Kimble, 1961). Of the four types of classical conditioning enumerated by Grant (Melton, 1964), that which most closely resembles the procedure used in this study is *instructed voluntary conditioning.* That writer cites an experiment by Marquis and Porter in which the Ss had instructions to blink as rapidly as possible whenever they heard a sound. The CS was a change in illumination (Figure 1). The results obtained showed that Ss did learn to respond to a neutral stimulus (the illumination change) although they were not instructed to.

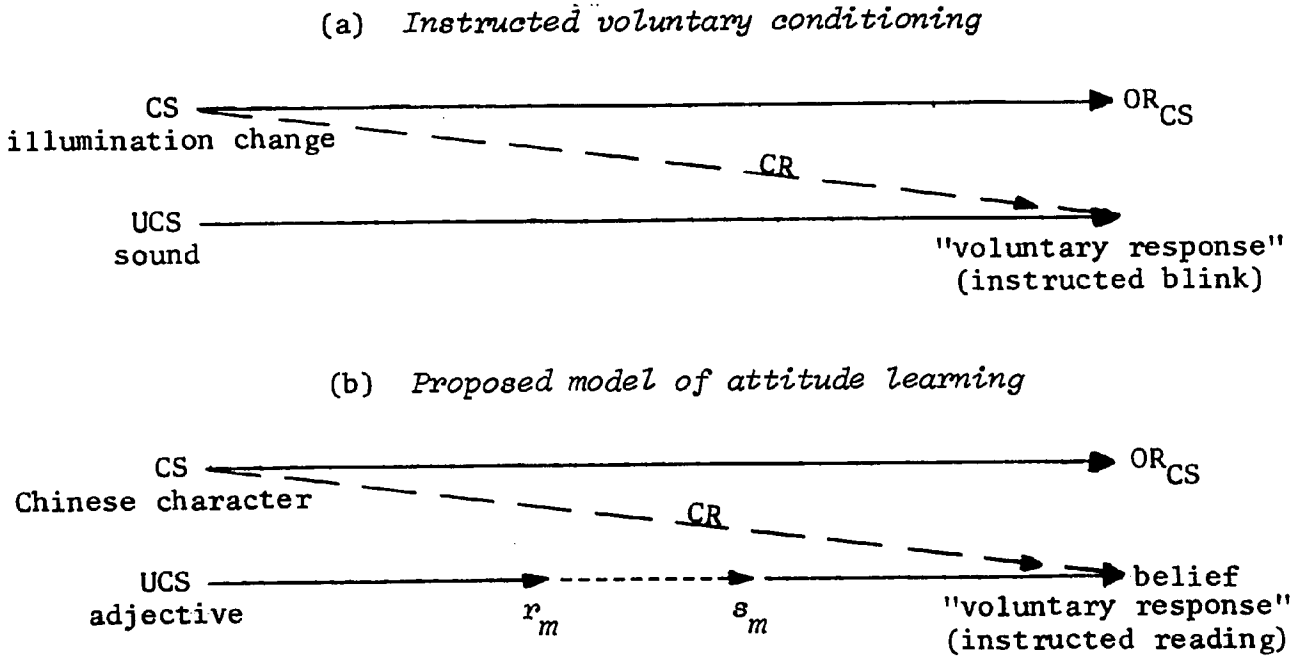


Figure 1. A Schematic Representation of Affective-Association Learning

The proposed model assumes a mediational response which produces a response that includes a belief and an emotional component, a form of second-order conditioning. In the actual experiment for this dissertation a neutral Chinese character to which S attends preceded the adjective which in turn was to elicit an overt response as well as the partial response (Osgood, 1961).

Several investigators have shown that conditioning can produce attitudes (Staats and Staats, 1958), or attitudinal transfer (Das and Nanda, 1963). The basic assumption is, however, that once established, the evaluative or attitudinal response does not change in intensity or direction, unless specific efforts are made to effect this change. Katz and Stotland (1963) discuss a study carried out by Janis and Feshbach in which these investigators associated fear and failure to care for the teeth. Three groups received varying amounts of information about the consequences of neglect. Katz and Stotland attributed the failure to follow instructions of the group exposed to maximum fear appeal to a spread of negative affect. Staats and Staats (1963) discuss the case of the physician who has to inoculate a child, much to the latter's discomfiture: after "one, two times ... the sight of the physician itself elicits the crying behavior" (p.36). Katz and Stotland cite a similar hypothetical instance of a child who develops an unfavorable attitude toward the strong soap emanating from a dentist's hands. If repeated sufficiently, they assert, the attitude should become permanent. They suggested narrowing the affect to the appropriate object to mitigate the spread of negative affect. There is evidence to indicate that mere repetition, in the form of frequency of experience with (or exposure to) the

appropriate object might result in a shift in the direction as well as the intensity of the attitude.

Frequency and value

Several studies investigated the relationship between the value of a word and the visual recognition threshold. Postman, Bruner, and McGinnies (1948) drew attention to word value in a study of value preference. They found that the visual thresholds of their Ss were lower for words closely related to their personal value systems than words not so related. McGinnies (1949) followed this study with another to demonstrate the existence of perceptual defense. He found that taboo words had higher thresholds than neutral words. Howes and Solomon (1950) criticized this study with the assertion that the fact taboo words occur less frequently in printed language than do other words could partially account for the results. To circumvent the charge that tabulation of printed materials did not reflect the true percentage of their usage and to demonstrate that there was such a frequency effect, Solomon and Postman (1952) varied the frequency of the almost meaningless stimuli that they used. The predicted results obtained; the recognition thresholds varied inversely with frequency of usage. Goldiamond (1958) challenged the entire series of experiments on word value and frequency by demonstrating that the effect of frequency was apparently one of response bias. Zajonc and Nieuwenhuyse (1964), demonstrated in turn that this was not wholly the case, that the occurrence of lower frequency words at higher rates of exposure did have lowering effects on the visual recognition threshold.

If one will grant that, for less frequent words at least, an increase in their frequency leads to lower visual recognition thresholds, a relationship depicted in Figure 2 becomes reasonable.

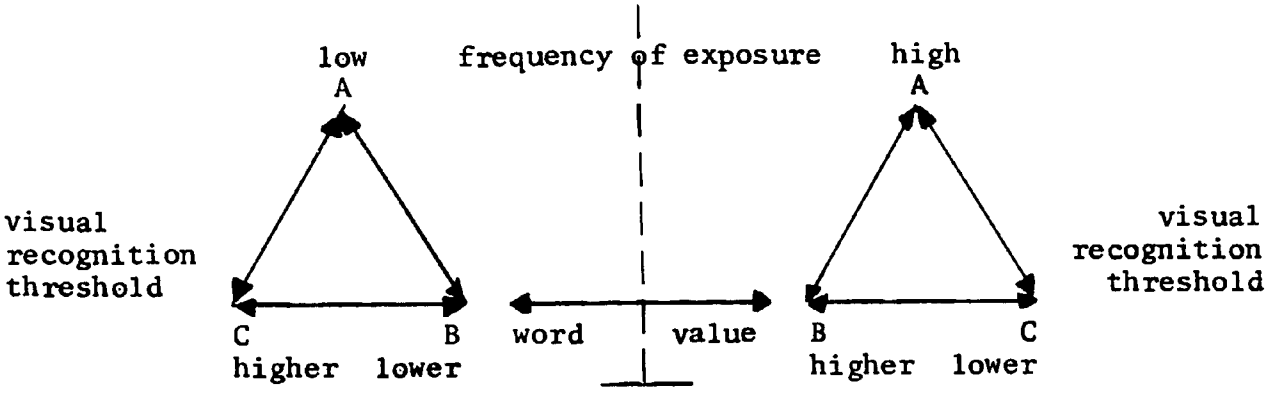


Figure 2. A Proposed Schematic Representation of Visual-Recognition-Threshold and Word-Value Levels Under Two Conditions of Frequency of Exposure.

The previous paragraph reviewed the evidence to show the feasibility of the *AC* relationship under both conditions. There is also evidence that the more frequently an individual experiences a word the more favorably disposed toward it he is (*AB*). Johnson, Thomson, and Frincke (1960), on the basis of their work with the semantic differential, affirmed that there was some relationship between the rated goodness of words (the authors' operational definition of value), the frequency of their occurrence, and the determination of visual thresholds. With frequency held constant they found significant differences in visual duration thresholds for "good" and "bad" words; in a second instance they maintained affectivity (word value) constant and related the visual duration threshold to frequency. The lower thresholds did reflect an

advantage for the more frequent words. In addition the intensity of ratings assigned to words did seem to vary directly with their frequency; and, in a set of twenty-six word-pairs, Ss preferred the more frequent as the more pleasantly-toned word. A series of experiments reported by Zajonc (1965) examined this relationship between word value and frequency under increasingly more stringent conditions. In the first of these, "Turkish" words served as learning materials. The intent of the experiment was similar to that of Johnson, Thomson, and Frincke. The experimental design contained a provision for varying the frequency of exposure for every word, a precaution they had not made use of. The results revealed a clear effect of frequency on rated value. The second study eliminated the possibility that Ss could pronounce the stimuli either overtly or covertly by the use of Chinese characters for the American subjects. Despite the limitation of the Ss' activity to attending to the presented stimuli, the exposure effect was apparent for all stimuli but one. A study undertaken by Becknell, Wilson and Baird (1965) has contributed to the understanding of the relationship. In their experiment Ss more often selected boxes of stockings with brand names formed from nonsense syllables that had been exposed more frequently than they chose those labeled with syllables observed less often. Munsinger (1964) reported an experiment in which the CVC's had definite associative and evaluative values. Ss were able to expose those trigrams chosen for low evaluation but matched for association. Once they had reached an asymptotic rate of key pressing they exposed CVC's higher in evaluation, but again matched on association value. A significant increase in response rate followed the change in affective value of the letters.

Koen (1962) found some correlation between the frequency of usage of a word and its evaluative rating: the analysis of his data disclosed that the high frequency words had received the more favorable ratings.

These studies have indicated that there is a relationship between frequency of usage and word value. Appendix E lists the rated values of words used in this study, words chosen on the basis of their ratings alone. It also lists their frequency of usage as determined from the Thorndike-Lorge tables. In general there appears to be a correlation. The relationship persisted under a new rating of the adjectives by means of a technique proposed by Noble (1958). The favorable words also occurred more frequently as idiosyncratic responses to the Kent-Rosanoff list (Palermo and Jenkins, 1954).

Frequency, value, and attitude change

High frequency of exposure generally results in lower visual thresholds; the more frequent words are usually the more highly valued; individuals often prefer words they have experienced more often. These three statements lend support to a conclusion that pairing of a neutral stimulus and an adjective, scaled for affectivity, should produce a mediating response that would be more favorable in intensity and direction than before as a consequence of repeated exposures. Furthermore this postulated heightening effect should be predictable for most combinations of neutral CS and affective UCS.

This study hypothesizes that the amount of change in a positive direction is a function of the experience the individual has had with the affective association. The more frequently he has had the stimulus exposed to him, the more favorably disposed toward it he should be.

Operationally there should be significant differences in a positive direction between measures obtained at low and high frequencies of exposure under different conditions of affective association.

H_1 = *there are no systematic effects due to rate of exposure alone.*

H_2 = *there are no systematic effects due to affective value alone.*

H_3 = *there are no systematic effects due to a combination of a particular rate of exposure and particular affective value.*

Summary

This chapter has examined the implications of a recently proposed concept of attitude structure characterized by the assumption of mediating responses as evaluative equivalents of attitude, and of beliefs as an important, additional component. The classical conditioning paradigm served as an analogous model to account for the formation of affective associations, a kind of attitude. This led to the observation that predictions about the constancy or change of an affective association were highly speculative. An account of the experimental work on word frequency, word value, and visual recognition threshold supported a belief in an enhancement effect attributable to frequency of exposure. The inference that frequency of exposure might exert a similar ameliorating effect on affective associations encouraged the formulation of a hypothesis to put this line of reasoning to the empirical test.

CHAPTER THREE

METHOD

Experiment 1

The plan and purpose of the experiment resembled that utilized by Zajonc (1965) in a recent study, wherein a single investigator presented a set of twelve Chinese characters to individual subjects at varying frequencies of exposure. At the conclusion of the experiment each subject made recognition responses on a seven-point rating scale. The present investigator extended this technique to a classical conditioning paradigm. There were twelve adjectives of three categories of valence: positive, neutral, and negative, which served as the unconditioned stimuli. For each word there was an individual affective value derived from data provided by Anderson (1964).

TABLE 1

SCALED AFFECTIVE VALUES FOR ADJECTIVES USED AS UCS

UCS	Value	UCS	Value
1. intelligent	5.37	7. solemn	2.89
2. thoughtful	5.29	8. ordinary	2.66
3. wise	5.28	9. annoying	.84
4. interesting	5.11	10. insincere	.66
5. cautious	3.34	11. obnoxious	.48
6. quiet	3.11	12. phony	.27

The twelve Chinese characters served as the conditioned stimuli. In terms of favorableness their scale values clustered within the middle range of an eleven-point scale (Appendix D). Figure 3 depicts the sample character and an affective term used as the training stimulus prior to the test.

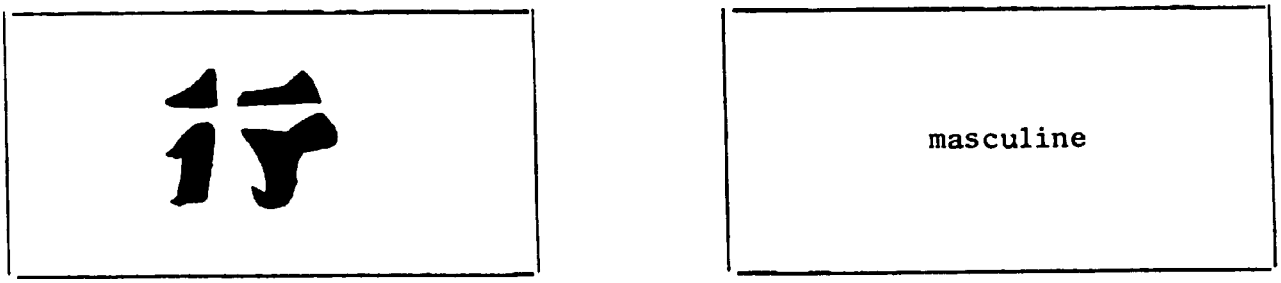


Figure 3. Practice CS-UCS Used to Demonstrate Experimental Task

At the conclusion of the trials each subject responded on an eleven-point scale to a test composed of the twelve characters alone.

Subjects

The group of Ss, all of American extraction, consisted of 36 females, University of Michigan undergraduates or graduates, who had volunteered for paid participation.

Materials

The design of the experiment necessitated twelve distinct blocks. The preparations for any one block entailed the contiguous pairing of each character (CS) with each adjective (UCS), a total of 144 pairs (Appendix B, Experiment 1). E developed by chance methods a random list of these pairs and to each cell in a block assigned one pair under the constraint that the UCS had to appear in a cell which

corresponded to its valence. Therefore each CS appeared under all possible conditions and the twelve UCS filled the forty-eight cells of each valence available to them.

This resulted in a four (frequency of exposure) by three (valence of affect) fixed-factor design. The counterbalancing of all the pairs eliminated the need to consider subjects as a main effect.

The CS occupied one side of a whitestock card, 3" x 5", in size. On the reverse side of the card in elite capital letters was its UCS. For each block there was a numbered packet that contained the twelve pairs to be presented contiguously. The order of presentation within each block was randomly determined. For any one block there was a particular sheet which listed the order of presentation for each pair (Appendix C). The sole restriction made on the list was that no pair was to be shown more than one time in succession. E reversed the positions of any repeated pairs with the next different pair in order to meet this limitation. The white card had in its upper lefthand corner a private code that matched a similar figure on the schedule. This code was of such difficulty and size so as to assure its identification by E in time for exposure, but was of sufficient intricacy to prevent decoding by S.

A session for each subject consisted of any one block, in which she attended to the twelve CS - UCS pairs a total of 120 times. The stimuli appeared at frequencies of exposure in accordance with the requirements of any cell, i.e. one, three, nine or twenty-seven times, which is a log function. At each frequency there was for any CS a corresponding UCS of positive, neutral, or negative valence.

Procedure

The same E tested each S individually. Each session lasted on the average twenty minutes. The Ss for the most part were naive, although some few admitted having served as paid subjects for other kinds of unrelated experiments. Each S sat facing E across a table three feet wide in a narrow room, which was illumined by conventional fluorescent lighting. Between S and E at the height of one foot and of a width of three feet was a solid triangular coding stand with two sides sloping away from an apex toward either individual. There were horizontal slats on E's side of the stand that enabled him to arrange the stimuli before the arrival of S, but which prevented the latter from seeing the stimuli at any but the correct time. E maintained a control sheet and deleted the symbol for each pair immediately after presentation. The sheet served to record three replications. E presented each stimulus to S at eye level for an optimum rate of exposure of two seconds per side per card by silently counting 1001, 1002, 1003. There was no rest interval. Upon exposure of the CS, every S, in accordance with the instructions read to her prior to the experiment, studied the figure intently and silently. After E had reversed the card to expose the UCS, S pronounced it aloud. E did not permit S to anticipate this verbal symbol. Immediately after S had pronounced the final UCS, she received a mimeographed sheet on which appeared twelve individual eleven-point scales. E displayed the practice symbol and succintly instructed S in the correct procedure for indicating the direction and intensity of her preference for the practice symbol. She was to use the same technique during the test phase. Each eleven-point scale had two labeled poles; at one end was the phrase, I LIKE IT; at the other, I DISLIKE IT. E proceeded directly to reveal the

twelve previously experienced CSs in individual sequences of two seconds apiece. S made a check mark in the desired category on the appropriate scale for each stimulus.

One S admitted to having studied Japanese, but at the same time noted that she had been unable to recognize or give the meaning of any character. The characters are of Chinese origin, and the Japanese have assimilated them for their own use. To eliminate any possible contamination of the data by the introduction of attitudes toward the Red Chinese, Ss received the information that the symbols were Japanese. A student of that language had rendered the characters in a style characteristic of the latter nation. The slight differences represented aesthetic preferences rather than linguistic changes. At the conclusion of several experiments Ss commented that the nature of the test had surprised them, in that they had anticipated having to reproduce the figures from memory.

Experiment 2

At the conclusion of the first experiment E experienced some misgivings as to a possible bias inherent in the distribution of the UCS. Was the trend an accurate indication of the hypothesis or did the unequal distribution of the adjectives at each level contaminate the results? As there were four rates of exposure and but three levels of affect, the complete randomization of both the characters and the adjectives proved elusive. A satisfactory randomization of the characters seemed to impose a limitation on a similar distribution of the adjectives, and conversely. *Obnoxious* had occurred more frequently with

characters at lower levels than at higher levels, as had *quiet* and *intelligent;* whereas *annoying, ordinary,* and *interesting* had appeared more frequently at the higher rate of exposure. If a specific value of an individual UCS had been influential, it could possibly have biased the results since *obnoxious* has a scale value of .48; *annoying,* that of .84. Therefore the design of the second experiment was such as to randomize completely the adjectives and to distribute the characters as equally as possible under the four rates of exposure.

Subjects

Some question arose subsequent to the first experiment in regard to the population sampled. In order to mitigate an educational bias which could result from the use of a pool of subjects from the University (white female upperclassmen), the second experiment made use of a more representative sample. The new Ss were of both sexes and of a wider age span (17-30), were negro or white, high-school and university students as well as employed adults. Each S had volunteered for paid participation. Due to the limited number of replications of each block, E set as the standard for exclusion from the experiment any consecutive run in a scale category that exceeded three. Whenever a S failed to meet the requirements of the instructions, a new S replaced him. This precaution, though time-consuming, eliminated Ss who had not attended to the stimuli. One senior checked the neutral position on ten of the twelve scales; another, a parent aged forty-five, remarked after the experiment that he had checked the highest scale position as many times as he did because he liked all the characters and could not understand why. In addition the data does not include the

practice of one man who said that he knew the language; of three persons who had checked one scale more than once; one person who indicated a slight discrepancy between the test and practice stimuli (Block 5), subsequently corrected, and nine subjects who responded to the various stimuli at the same category more than three consecutive times.

Materials

The second group of Ss saw the same stimuli as the previous group, the arrangement of blocks differed substantially, however (Appendix B, Experiment 2). A sample of six characters (A, C, E, G, I, K) appeared at rates of exposure of 1 and 9; the remaining characters (B, C, F, H, J, L) appeared at exposures of 3 and 27. At each level of affect a character appeared twice: e.g. for Character A there were two measures at the appropriate exposure in association with positive, neutral, or negative adjectives. Thus Character *A* at the exposure rate of 1, appeared concurrently with *thoughtful* (block 1), *wise* (block 3), *quiet* (block 5), etc. The randomized adjective occurred three times at each rate of exposure with three different characters; i.e. *thoughtful* also paired with Character *E* (block 5) and Character *I* (block 9) at one exposure.

Procedure

The procedure followed that outlined in Experiment 1. E changed the direction of scoring however. Most favorable received a numerical value of 11 in contrast to the scoring procedure followed in Experiment 1, where it scored as 1. The high scores thus indicate a more favorable attitude. Ss responded to the words alone on a duplicate copy of the character-rating scale, in addition to rating the characters.

CHAPTER FOUR

RESULTS

The experimental test of the hypothesis made use of a Model I analysis of variance with two fixed effects: column effects which represented the rate of exposures treatment (1, 3, 9, or 27 exposures); and row effects representative of three levels of affect: positive, neutral, and negative. The strategy of analysis was that of the post-hoc comparison outlined in Hays (1963). The adoption of this plan permitted the comparison of all possible combinations of means whenever the analysis revealed a significant F-ratio. The scoring of the responses made by S's to the dependent variable, the CS or Chinese characters, with the most favorable scored as one and the least favorable as eleven on a linear scale of assumed equal intervals, provided the raw data for the analysis. On the basis of previous pilot experiments the investigator set the alpha level at .05 for each effect.

A summary of the means of the data outlined from the experiment appear in Table 2. The totals for each column disclose an increase in a positive (lower) direction which reaches its point of greatest favorability at the exposure rate of nine. Within each column there are differences in the predicted direction between each level of affect with one exception: at twenty-seven exposures the pattern diverges slightly from the expected in that its mean value is slightly larger than the neutral. Figure 4, a geometric representation of the mean values, depicts by means of curves drawn freehand the values at each rate of exposure.

TABLE 2

EXP. 1: A SUMMARY OF OBTAINED MEAN RATINGS OF CS "GOODNESS"

Valence	Rate of Exposure				Row Total
	1	3	9	27	
Positive	5.25*	4.58	4.14	4.06	18.03
Neutral	5.67	4.69	5.22	5.56	21.14
Negative	5.86	6.14	5.33	5.53	22.86
Column total N=36	16.78	15.41	14.69	15.15	M=62.03

*Most Favorable equals *1*.

The total disparity between affective values shown on the graphs appears in numerical form as the marginals in Table 2. An analysis of variance (Table 3) for the two factors led to the rejection of the hypothesis of no row effects (H_2, $p < .01$) but failed to permit the rejection of the hypothesis for no column (H_1) or combinatory effects (H_3).

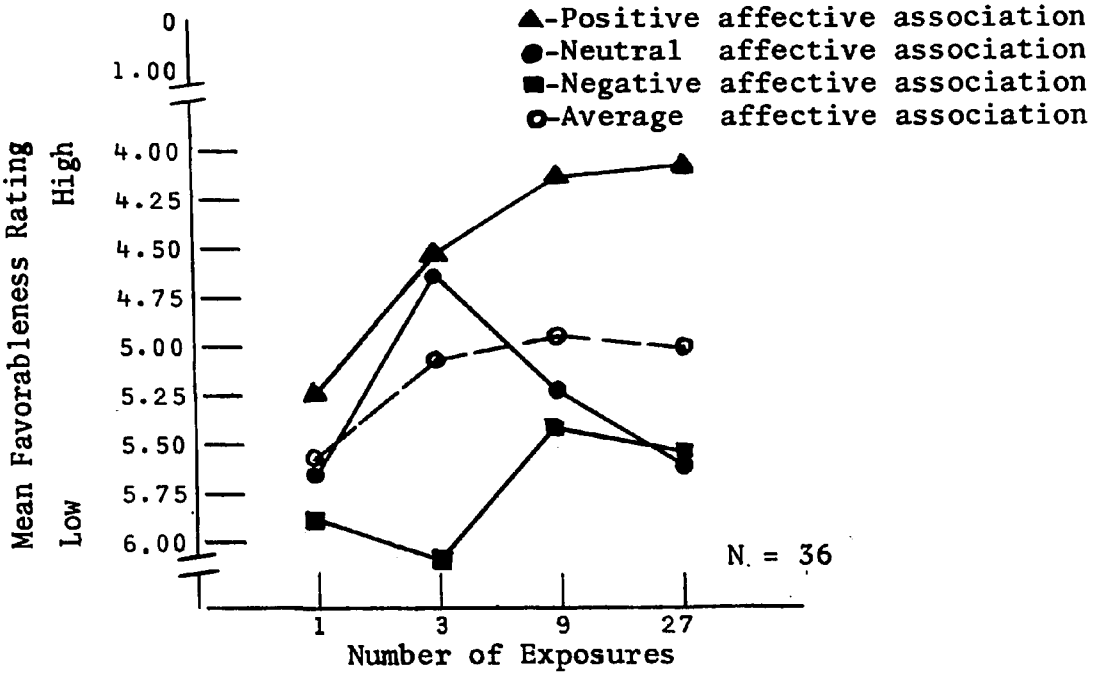


Figure 4. Exp. 1: A Geometric Representation of Mean Ratings of CS "Goodness".

TABLE 3

EXP. 1: ANALYSIS OF VARIANCE FOR RATED "GOODNESS" OF CS

Source	df	SS	MS	F	p
A Exposures	3	29.50	9.83	1.14	
B Affective Value[x]	2	119.75	59.88	6.96	< .01
C Interaction[y]	6	33.87	5.65	.66	
Within Cells	420	3610.17	8.60		
Total	431	3793.30			

[est. $\omega_{x/y}^2 = \frac{183.12 - 25.80}{3973.3 + 8.6}$ or .04]

The Scheffé procedure for comparison of means reveals that all but one of the differences between all means are insignificant; in each instance the confidence interval fails to cover zero. A comparison from one level to another, positive to negative, at 27 and 3 exposures respectively, (Table 4), reveals a significant difference; at equal rates of exposure the difference disappears.

TABLE 4

EXP. 1: A COMPARISON BETWEEN LEVELS OF PAIRS OF MEAN RATINGS OF AFFECTIVE "GOODNESS"

Rate of Exposure - Positive Affect		Rate of Exposure - Negative Affect			
		1 5.86	3 6.14	9 5.33	27 5.53
1	5.25	+ .61	+ .89	+ .08	+ .28
3	4.58	+ 1.28	+ 1.56	+ .75	+ .95
9	4.14	+ 1.72	+ 2.00	+ 1.19	+ 1.39
27	4.06	+ 1.80	+ 2.08**	+ 1.27	+ 1.47

**< .05

Trends

The assumption that both factors are fixed, that the levels of both factors represent steps along an underlying quantitative scale, which are equally spaced, facilitates the computation of trends (Winer, 1962). The linear component of the variation due to the main effects of treatment accounts for 59 per cent of the variance. The measurements in each cell reflect some function of the levels of affective value. The quadratic component accounts for 41 per cent of this variance. The F ratio ($F_{.95} = 2.02$) is not significant as $F_{.95}\ (1,420) = 3.84$. An examination of levels of affective value at different steps in the treatments reflects an overall F-ratio significant at the .01 level. The linear trend accounts for more than 95 per cent of the variance. At different levels of treatment the criterion measure is a linear function of level of treatment. The interaction, though not significant, implies that the response surface may be homogeneous, that at least some profiles may be parallel. The quadratic x linear component of interaction indicates the best fitting response surface for the data (Table 5). Profiles for affective value (a) at fixed levels of rate of exposures (b) are mainly quadratic in form. Profiles for rates of exposure at fixed levels of affective value tend to be linear (Figure 5).

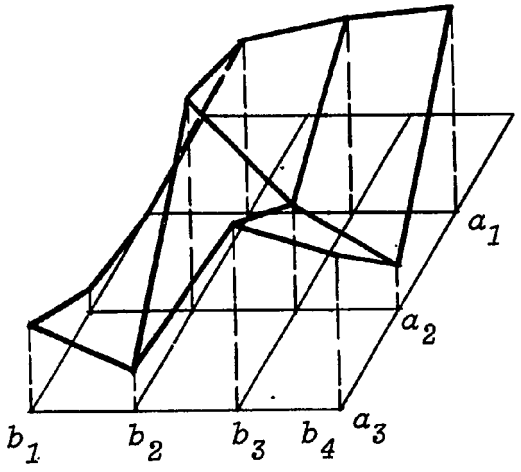


Figure 5. Exp. 1: Response Surface for Levels of Affective Value (a) and Frequency of Exposure (b).

TABLE 5

EXP. 1: ANALYSIS OF TRENDS

5.1. Trends of *Frequency of Exposure* Main Effects

linear $= \frac{(195)^2}{36(3)(20)} = 17.60$ 59% $F = \frac{17.60}{8.60}$, 2.05 N.S.

quadratic $= \frac{(73)^2}{36(3)(4)} = 12.34$ 40%

cubic $= \frac{25}{36(3)(20)} = \frac{.001}{29.94}$ 1%

5.2. Trends of *Affective Value* Main Effects

linear $= \frac{(182)^2}{288} = 115.00$ $F = \frac{115}{8.60} = 13.37$ $p < .01$

quadratic $= \frac{(58)^2}{36(4)(6)} = \frac{4.24}{119.24}$

5.3. Trends within *Frequency of Exposure* - *Affective Value* Interaction

linear x linear $= \frac{(72)^2}{36(4)(6)} = 3.60$

quadratic x linear $= \frac{(216)^2}{36(40)} = 10.80$

linear x quadratic $= \frac{(32)^2}{36(8)} = \frac{3.56}{17.96}$

The shape of the curves and the overall significance of the row effect implied that, were there significant differences yet none had become evident as a result of comparisons among the original measures, they would possibly become patent upon recombination and reanalysis of the data. The most consistent and least distorted reordering of data would collapse four treatments into two, a low log rate of exposure (1-3 presentations) and a high log rate (9-27 presentations). This would allow an examination of the effects under conditions closely related to the original.

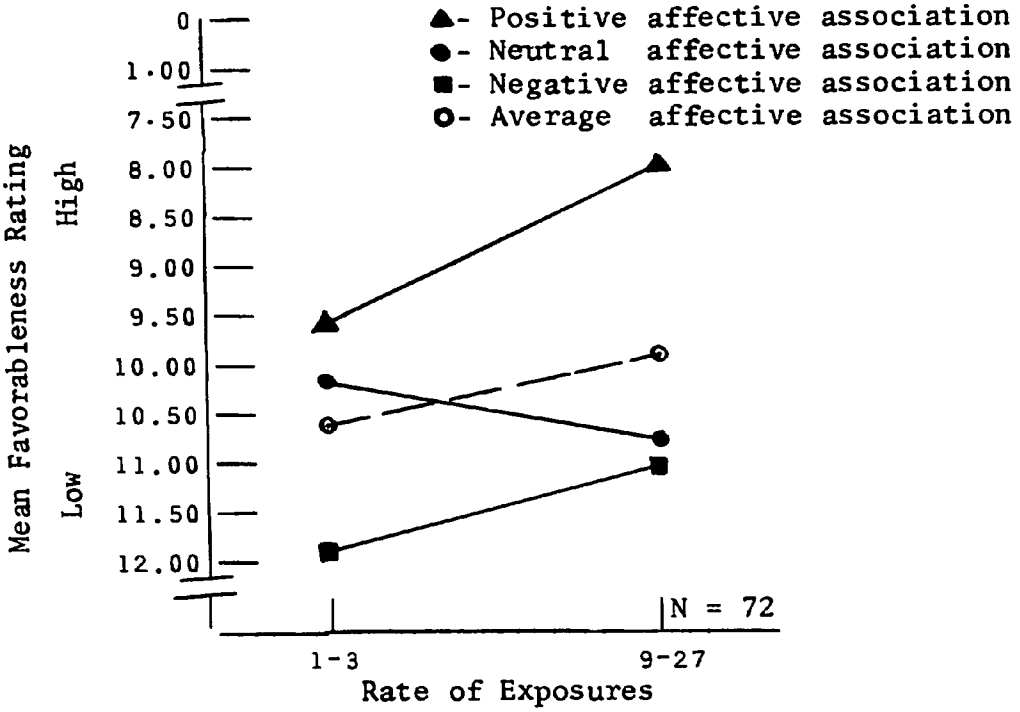


Figure 6. Exp. 1: A Geometric Representation of Mean Ratings of CS "Goodness" at Combined Rates of Exposure.

This integration of four treatments into two depicted geometrically in Figure 6 makes even more evident the enhancement effect predicted by Zajonc (1965). The slopes for negative and positive associations appear

TABLE 6

EXP. 1: ANALYSIS OF VARIANCE FOR RATED "GOODNESS" OF CS COMBINED AT LOW (1-3) AND HIGH (9-27) RATES OF EXPOSURE

Source	df	SS	MS	F	p
A Exposures	1	33.45	33.45	1.52	
B Affective Value	2	215.40	108.02	4.90	< .01
AB Interaction	2	42.01	21.01	.95	
Within Cells	210	4629.47	22.05		
Total	215	4920.33			

by visual inspection to be nearly parallel and to be increasing in a favorable direction. The neutral affective association curve, however, decreases in favorableness, which only apparently runs counter to the hypothesis. An analysis of variance (Table 6) for the new arrangement sustains the plausibility of the rearrangement in that there appears no contradiction of the results previously noted for column or interaction effects. The F ratio for rate of exposures has increased, which directs attention to the influence of frequency, but the increment is not sufficient to qualify the effect of this variable as significant. In the linear comparison of means there are no significant differences in rated "goodness" between associations formed at low and high rates of exposure (Table 7).

TABLE 7

A SUMMARY OF MEANS COMBINED INTO TWO RATES OF EXPOSURE LOW (1-3) AND HIGH (9-27)

Affective Value	Rate of Exposure		Difference in Favorability
	1-3	9-27	
Positive	9.83 σ = 4.328	8.19 σ = 4.808	+ 1.64
Neutral	10.36 σ = 4.45	10.77 σ = 5.17	- .41
Negative	12.00 σ = 3.99	10.86 σ = 4.94	+ 1.14

The reexamination of the data under the combined rates of frequency of exposure designated as low and high simplifies the representation of the direction of change each Chinese character (CS) has undergone. The bar graphs in Figure 7 summarize these changes. A change in the positive direction from a high to a low mean rating of "goodness" indicates an increase in favorability toward the CS. In similar fashion a change in rated "goodness" from a low to a high mean value indicates a decrease in favorability. A majority of the changes, although insignificant, are toward greater favorability. In addition there is no consistent pattern of changes in a negative direction. Two of the largest decrements occur at the level of neutral affective associations (*E* and *K*). The CS which recorded the greatest change toward rated "badness" from a higher "goodness" was *L*.

A bar graph (Figure 8) similar to the previous one in intent depicts the effects of frequency of exposure on the UCS side of the CS-UCS bond. Six of the nine adjectives reveal changes in mean ratings in the predicted direction. The effect of frequency on the UCS is not as clear since two of the adjectives, *ordinary* (neutral) and *phony* (negative) appeared less frequently at higher rates of exposure. The third, *interesting* (positive), displays a very slight change positively. There are no mean scores at higher frequencies for three adjectives, one at each valence level.

The F ratio obtained for the row effect, affective value, allows as an estimate as to how much variance in the interaction knowledge of affective value accounts for. The ω test for the strength of the relationship indicates that the numerical value is a little more than four percent.

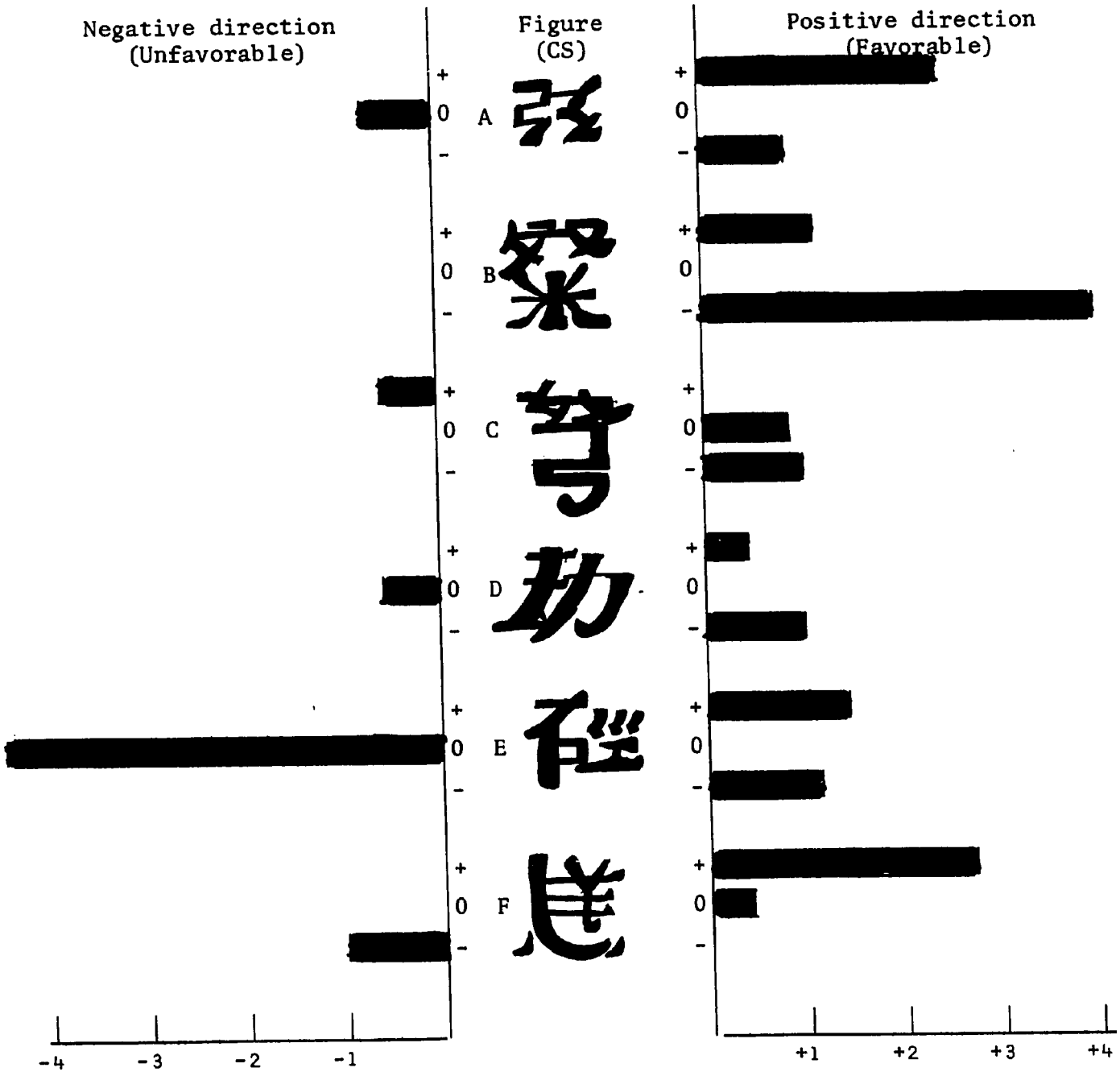


Figure 7. Exp. 1: A Graphic Summary of Change in Direction for the Difference Between CS Means Obtained at Low (1-3) and High (9-27) Rates of Exposure Under Three Conditions of Affect.

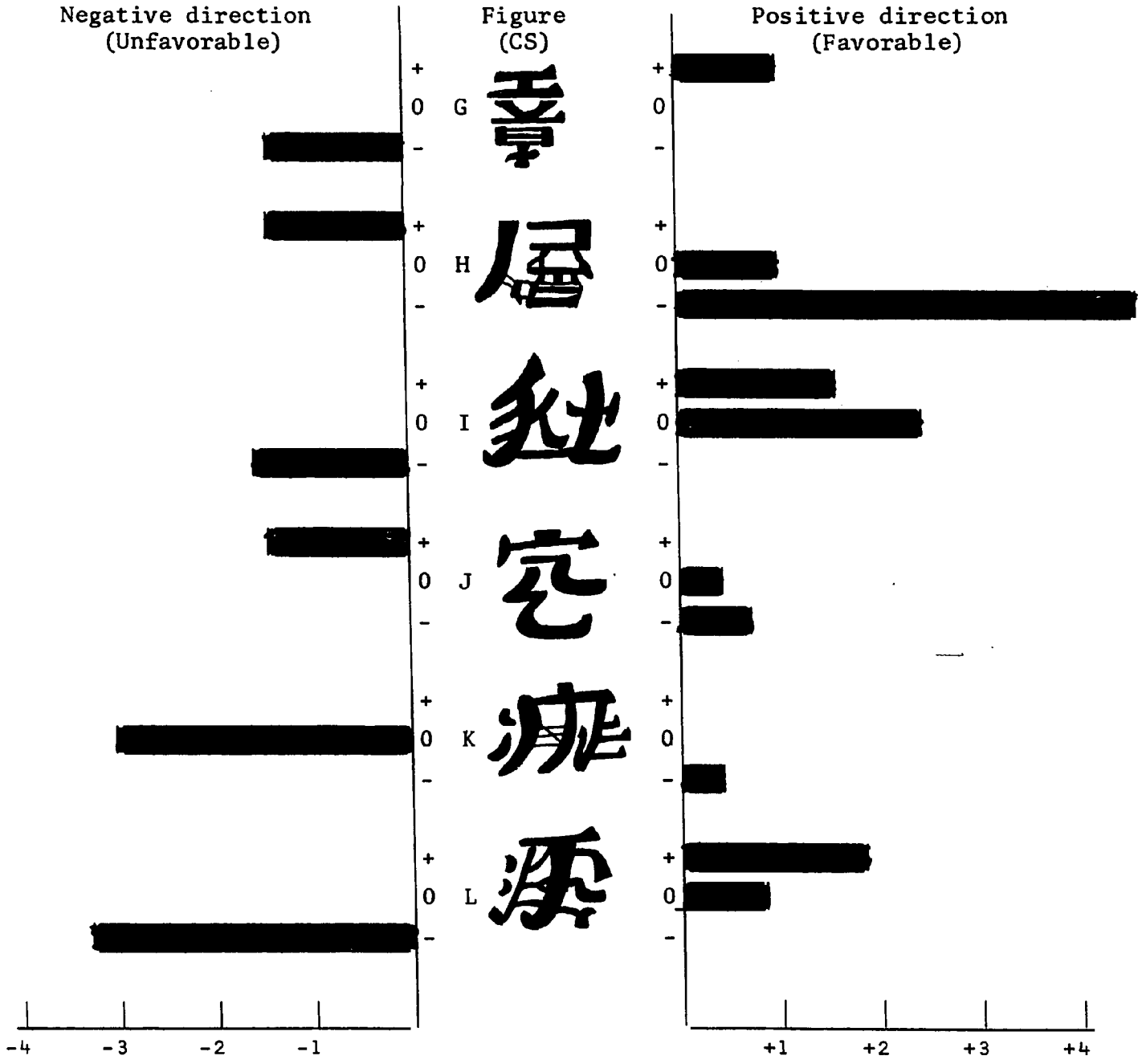
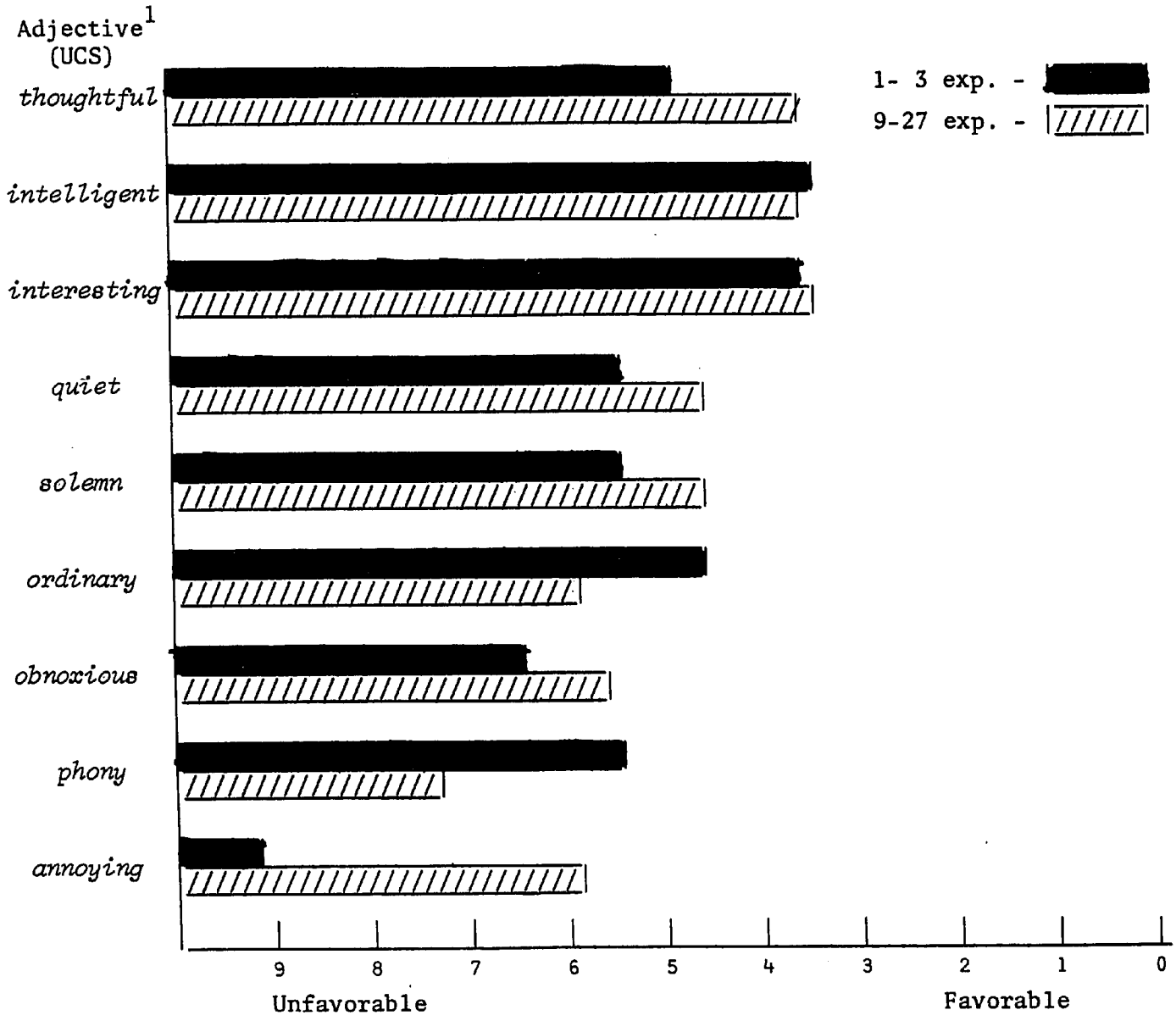


Figure 7. Exp. 1: A Graphic Summary of Change in Direction for the Difference Between CS Means Obtained at Low (1-3) and High (9-27) Rates of Exposure Under Three Conditions of Affect (continued).



[1]One adjective under each valence does not appear, as there was no mean score under either low or high rates.

Figure 8. Exp. 1: A Graphic Summary of Change in Direction for the Difference Between CS Means Obtained at Low (1-3) and High (9-27) Rates of Exposure.

Experiment 2

The results of the experiment which appear in Table 8 offer scant basis for attributing any significant change to frequency. There does occur a trend in the neutral condition and a possible one in the negative level, nothing about which to make definite statements, however. None of the differences between means as a consequence of exposure reach significance.

TABLE 8

EXP. 2: A SUMMARY OF OBTAINED MEAN RATINGS OF CS "GOODNESS"

Valence	Rate of Exposure				Row Total
	1	3	9	27	
Positive	7.67*	7.92	7.56	7.61	30.76
Neutral	6.06	6.86	7.56	7.11	27.59
Negative	6.33	6.69	6.14	6.50	25.66
Column Total N=36	20.06	21.47	21.26	21.22	84.01

*Most Favorable equals 11.

The significant values occur between the levels of affective association. Once again it is not possible to reject H_1 or H_3, but H_2 reaches a significance level of .01, with some interaction (Table 9).

TABLE 9

EXP. 2: ANALYSIS OF VARIANCE FOR RATED "GOODNESS" OF CS

Source	df	SS	MS	F	p
A Exposures	3	5.46	1.82		
B Affective Value	2	106.68	53.34	6.93	< .01
C Interaction	6	124.13	20.69	2.60	< .025
Within Cells	420	3347.72	7.97		
Total	431	3584.00			

Visual inspection of the data suggests that the relationship is quadratic-linear, as in Experiment 1. The positive curve reaches its asymptote at a low frequency whereas the neutral curve does not begin to level off until the nine-exposures treatment. The negative curve accelerates in a positive direction but not an amount sufficient to ascribe any significance to it. The sums for the columns indicate an increase in a positive direction over the four rates of exposure but at no more than a rate obtainable by chance.

TABLE 10

EXP. 2: A COMPARISON BETWEEN AFFECT LEVELS OF MEAN RATINGS OF "GOODNESS" (POSITIVE LEVEL AS REFERENT)

Affective Values	Rate of Exposure			
	1	3	9	27
Positive	-	-	-	-
Neutral	*	*	-	N.S.
Negative	*	*	*	*

*Difference < .05

Table 10 contains a comparison between means for affective associations. At the lowest rate of exposure the positive words differ significantly from the neutral and negative as expected. This difference persists at the higher frequency of three in spite of the fact that positive and neutral have increased in favorability. At nine exposures the positive curve has decelerated and the neutral has attained a rated *goodness* equal to that of the positive, both of which remain significantly different from the negative. The difference between positive and negative at the highest frequency holds significant although the neutral curve is decelerating.

TABLE 11

EXP. 2: AN ANALYSIS OF VARIANCE FOR UCS[1]

Source	df	SS	MS	F	p
A Exposures	3	3.23	1.08		
B Affective Value	2	33.84	16.92	1.76	N.S.
C Interaction	6	41.90	6.98		
Within Cells	420	4048.92	9.64		
Total	431	4127.89			

[1]Based on separate ratings of adjectives administered after rating of characters.

Immediately after they had responded to the favorableness scale for characters alone, Ss indicated their judgments of the affective value of the individual words on twelve distinct scales. The analysis of variance for these data (Table 11) revealed no effects as significant, whereas the rating of the characters alone had revealed some differences at least in row effects (Table 9). The means of the ratings progress in roughly linear fashion across the four rates of exposure without attaining significance (Table 12).

TABLE 12

EXP. 2: A SUMMARY OF OBTAINED MEAN RATINGS OF UCS "GOODNESS"[1]

Valence	Rate of Exposure				Row Total
	1	3	9	27	
Positive	8.69	8.64	8.67	8.47	34.47
Neutral	7.03	7.69	8.06	7.81	30.59
Negative	4.89	5.03	5.08	5.25	20.25
Column Total N=36	20.61	21.36	21.81	21.53	85.31

[1]Based on separate ratings of adjectives administered after ratings of characters.

*Most Favorable equals 11.

TABLE 13

EXP. 2: RATED "GOODNESS" OF UCS OVER FOUR RATES OF EXPOSURE[1]

Letter	UCS	Scale Value	Rate of Exposure (Sums)			
			1	3	9	27
M	thoughtful	5.29	82	77	72	88
N	intelligent	5.37	87	84	74	72
O	wise	5.28	78	75	85	71
P	interesting	5.11	66	75	81	74
		Sum	313	311	312	305
Q	quiet	3.11	71	75	83	86
R	solemn	2.89	68	75	78	70
S	cautious	3.34	68	71	71	70
T	ordinary	2.66	46	56	58	55
		Sum	253	277	290	281
U	obnoxious	.48	42	56	42	50
V	phony	.27	29	45	46	37
W	insincere	.66	52	33	51	61
X	annoying	.84	53	47	44	41
		Sum	176	181	183	189

[1]Based on separate ratings of adjectives administered after rating of Characters.

TABLE 14

EXP. 2: RATED "GOODNESS" OF UCS OVER FOUR RATES OF EXPOSURE

Letter	UCS	Scale Value		Rate of Exposure (Sums)			
				1	3	9	27
M	thoughtful	5.29		63	64	76	78
N	intelligent	5.37		78	76	70	72
O	wise	5.28		71	79	67	46
P	interesting	5.11		64	66	59	78
			Sum	276	285	272	274
Q	quiet	3.11		61	66	65	65
R	solemn	2.89		55	69	82	54
S	cautious	3.34		50	59	63	81
T	ordinary	2.66		52	53	62	56
			Sum	218	247	272	256
U	obnoxious	.48		57	68	67	71
V	phony	.27		46	50	49	60
W	insincere	.66		64	57	52	60
X	annoying	.84		61	66	53	43
			Sum	228	241	221	234

A breakdown of the obtained values for each adjective over each rate of exposure reveals a slight enhancement effect operative over each treatment (Tables 13 and 14). *Intelligent* and *annoying* are exceptions to this trend with *annoying* decreasing in favorability as the rates of exposure increased (*sic!*). The overall ratings of the CS-UCS associations, in contrast to ratings of CS alone, are definitely lower in value. The trend for positive values in both instances changes little; the neutral and negative curves appear to be moving in a positive direction. There is a slight tendency to overrate the positive and neutral, and underrate the negative, UCSs when they are seen alone. (Table 15).

TABLE 15

EXP. 2: A COMPARISON OF RATINGS OF CS-UCS MINUS UCS IN TERMS OF "GOODNESS" (TABLES 8 AND 12 COMBINED)

Valence	Rate of Exposure				Row Total
	1	3	9	27	
Positive	+ 1.02	+ .72	+ 1.11	+ .86	+ 3.71
Neutral	+ .97	+ .83	+ .50	+ .70	+ 3.00
Negative	- 1.44	- 1.66	- 1.06	- 1.25	- 5.41
Column Total N=36	+ .55	- .11	+ .55	+ .31	+ 1.30

Figure 9 indicates that about 50 percent of the changes undergone by one set of characters at frequencies of one and nine, or three and twenty-seven, are in a positive direction. *G* and *K* in the first experiment changed negatively; *K* in the neutral condition shifted the largest amount negatively in both instances. At nine and twenty-seven exposures

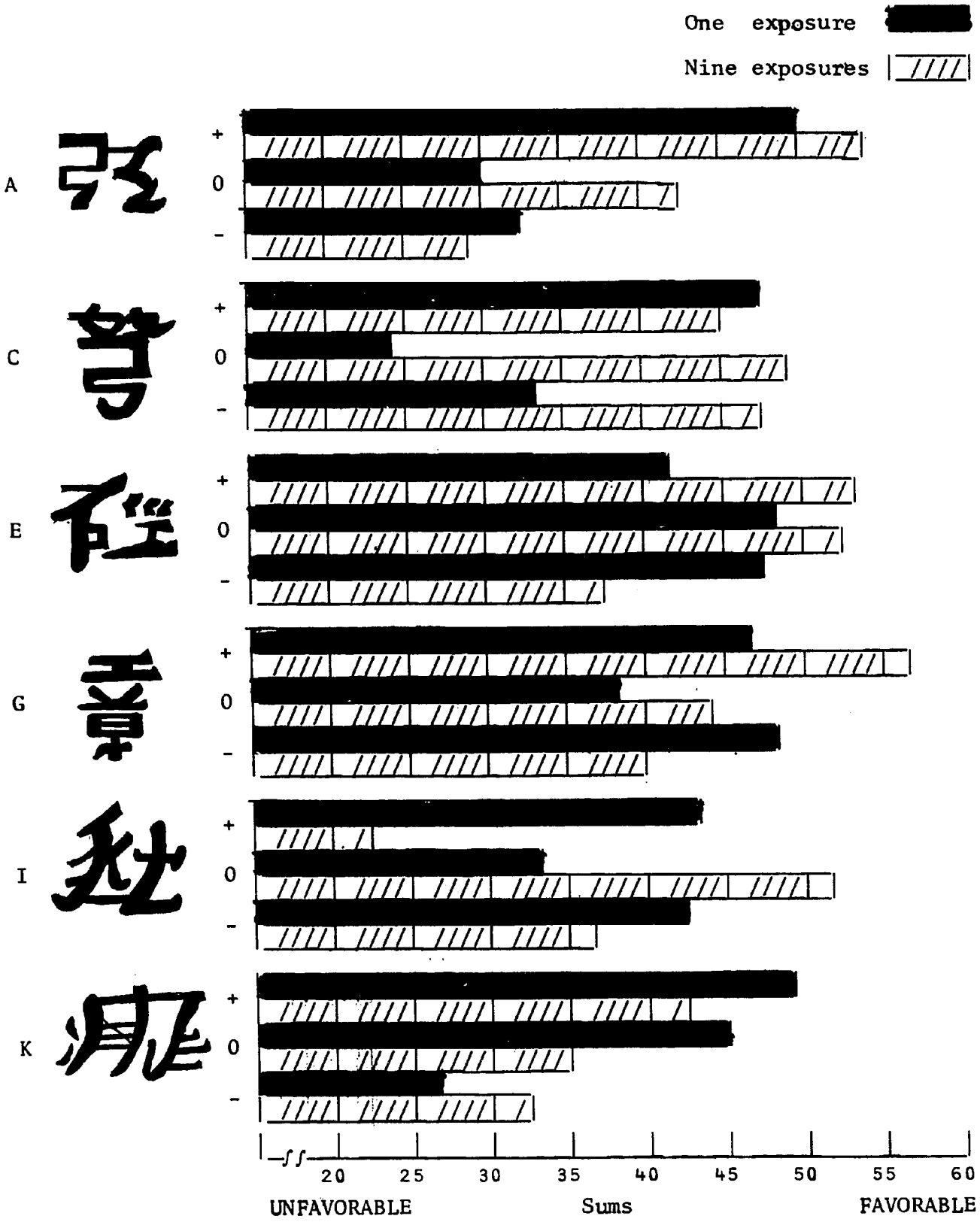


Figure 9. Exp. 2: A Comparison of Direction of Change of Set "A" CS at Two Levels of Exposure (1 - 9).



Figure 10. Exp. 2: A Comparison of Direction of Change of CS at Two Levels of Exposure (3 - 27).

on the positive level *H* shifted negatively in both experiments; yet *L*, which had appeared as many times as *K* in the previous experiment and had diminished in favorability, moved in a positive direction when it appeared only at a higher frequency in the second experiment. There is no consistent pattern which one may attribute to affect.

An analysis in terms of treatments (rate of exposure), independent variable (affective value), subjects within blocks, and blocks affords further insight into the factors operative in the experiment. This refinement clarifies the contribution that individual differences under specific learning conditions make to the phenomenon observed (Appendix F). This is especially true in Experiment 1 where the interaction of the blocks and rates of exposure have considerable significance.

CHAPTER FIVE

CONCLUSIONS

A more precise understanding of the gist of the remark attributed to Gertrude Stein, "What people loved they repeated; what people repeated they loved", derives from an empirical test of the two factors it specifies: love (affect) and repetition (rate of exposure). The initial statement in the aphorism presented a notion to the effect that what individuals liked they tended to choose as stimuli a second time. The test of this proposal would have required a hypothesis and design beyond that attempted here. The second section, though, most nearly approximates the hypothetical formulation of this study. The results of the experiment suggest, but do not prove conclusively, that higher frequency of exposure, or repetition, does make a stimulus appear as more favorable to individuals in contrast to the rating accorded such a stimulus at lower frequencies.

The conclusion that frequency of exposure tends to enhance the rated "goodness" of favorable associations seems logical. One could reasonably surmise that at least to a certain limit commerce with stimulus objects which have likeable attributes is pleasurable and becomes more so the more frequent the opportunity to interact with them. A careful consideration should indicate that neutral associations should not change much, in that a neutral association is a minimal emotional association. Neutral implies that the stimulus elicits neither a strong nor weak affective response. Scaled values for neutral items (obtained from responses derived from large numbers of Ss) cluster about the midpoint on

category scales. It does seem contrary to logic to predict that negative associations will receive better rather than poorer ratings of "goodness" at higher rates of exposure. That this may be consonant with the results sought in this study and with related research however, and only apparently illogical, should derive from the explanation that follows.

Koen (1962) showed that neutral words correlated more with meaningfulness than did words of strong stimulus emotionality. He reported that frequency of repetition (exposure) may have operated to reduce meaningfulness in emotional words. Noble (1958) reported a correlation of .57 between meaningfulness and emotionality. This numerical value is not too large to deny credibility to an assumption that for positive and negative associations the more important aspect of the association is the mediating evaluative response, and not belief measured in terms of meaningfulness. Belief would loom as more important in the formation of neutral affective associations. It seems probable that techniques to change attitudes such as affective associations should incorporate various rates of frequency of exposure. The caution that Katz and Stotland express in their treatment of the Janis and Feshback experiment cited earlier, "that in order to know the effectiveness of an emotional appeal, it is necessary to know whether the affect can be narrowed to the appropriate object" (p.460), anticipates an application of the frequency hypothesis: in the use of fear-inducing communications a larger number of exposures, three or more, of the most fearful stimulus material, the pictorial, than the least fearful, the informative but non-emotional, might be conducive to change in a positive direction. Additional presentations of the distressful material should eventuate in results similar to those obtained for the less distressing.

In the same manner the child who developed a negative association to the smell of the soap used by the dentist, after a series of gradual exposures, should become less antagonistic to it. The difficult problem in each case would be that of inducing Ss to discriminate more clearly the object associated with the affective association.

If meaningfulness is not the most necessary of the variables important for the enhancement of attitudes through frequency of exposure, another factor may exert an influence worthy of note. Familiarity has the virtue of being related to frequency, but not to meaningfulness (Schutz and Thysell, 1965). Noble (1954) has defined familiarity as a response variable, the magnitude function of physical events, analogous to trials in a contiguity-learning situation. He believed the phenomenon that accounted for the variable to be a memorial one, correlated in some way with stimulus constancy. Elsewhere (1955) he has written that stimulus compounds which have the least variability should maximally control the effective habit strengths accumulated during learning trials. Therefore in this experiment the CS-UCS which appeared at higher rates of exposure should have developed the greater habit strength. The least constant (lower rates of exposure) should have developed the least habit strength. Habit strength bears a relation to storage, or processing into memory, of a stimulus trace. Bernback (1965) studied the relationship between stimulus learning and the formation of associations. One of the principle outcomes of his experiment was that the entrance into storage of the stimulus appeared as crucial to the subsequent formation of associations. His data revealed that the context (the variety of stimuli) exerted little influence but that the size of the interval between presentations of the stimuli was most influential; the shorter the interval the more likely that the S

would remember the stimulus and make the specified association. The experiment reported herein made no provision for predetermined intervals. Prior to the experiment the E had prepared randomized presentations of stimuli. The number of presentations and the frequencies of each stimulus interacted to constrain the size of the intervals. A sequential analysis of one schedule disclosed that the average interval for stimuli presented at a rate of 27 exposures was 3; at a rate of 9 exposures, 11; at a rate of 3, the interval contained 28 intervening different stimuli. The more frequently presented stimulus appeared at much shorter intervals. Thus the probability of its entering into storage was higher than that for the less-frequently presented stimulus. The design of the experiment precluded any means of determining at which particular frequencies any proportion of Ss recognized the stimulus, and made the association.

The contention that memory facilitated the formation and influenced the possibility of elicitation of the CS raises a question as to the relationship between value and memory. Reproduction of a stimulus trace does not guarantee an increase in its rated "goodness". Allport (1955), in his exposition of the Bruner-Goodman experiments on perceived size and individual needs, reports an experiment in which the investigators built definite values into their young Ss. After ten days of reinforced trials with a pokerchip worth a certain value in candy purchasing power, the children significantly overestimated its size in their estimates. Memory of the chip resulted in overestimation of size, or value to the perceiver. Memory of the Chinese character, a resultant of higher frequency of exposure, could explain the more favorable ratings such stimuli received.

A review of some evidence provided by studies of stimulus familiarization may also contribute to an understanding of the enhancement

process. In addition to the experiments directly related to the frequency-value hypothesis, there are others indirectly of interest. Noble (1961) reported a facilitative effect on response learning when familiarized terms became the stimulus members of pairs. Underwood and Schulz (1960) have paired non-verbal stimuli with verbal responses in a paired-associates learning task and obtained a superior performance than when they paired verbal stimuli and verbal responses. They believed that verbal stimuli had generated an inhibitory effect not encountered with non-verbal forms. Binder and Feldman (1960) have found evidence in a series of perceptual experiments to support their hypothesis that the frequency of S-R pairing exerted a powerful influence on the determination of responses to ambiguous clues. Arnoult (1956) examined the recognition process. He presented Ss with varying amounts of experience with stimuli and then proceeded to have them rate these same objects on a familiarity scale. The data showed that the percentage of recognition obtained was a function of experience, and the best results occurred at a frequency of repetition of five.

A demurrer to the results obtained (especially those for negative affective associations) could allege that an adequate explanation is not that there is an enhancement effect attributable to higher rates of exposure, but that there is a tendency for both pleasant and unpleasant stimuli to become neutral or indifferent over time. Beebe-Center's law of affective equilibrium (1929) posited that for each succeeding experience there was a compensation equivalent to the sum of the previous experiences. "With a sufficient number of repetitions the total affective value to be compensated will increase to such a degree that the affective value of the stimulus will be brought down to indifference" (p.66). In their reference

to this law Verneer, Barry, and Bousfield (1933) noted a distinction between the effects of continuous presentations and those at interrupted intervals. They quote Fechner: "With a continuous (or repeated) stimulus the affective value increases up to a certain limit which can be designated as the ascending effect. If the stimulus is continued or repeated past the point of optimum affectivity its value is lessened...unless there is an intervening time interval" (p.32). Walker and Tarte (1963) in turn have predicted that high arousal during the associative process would eventuate in a more intense trace process which subsequently would eventuate in greater ultimate memory but greater temporary inhibition against recall, or the strong evaluative response should not appear until much later than the time at which Ss made their judgments in this experiment.

According to such an interpretation of the data the neutral and negative curves represent a predictable trend to the neutral condition as a result of inhibition. The curve for the positive affective association in Experiment 1 belies the adequacy of such an interpretation to account for the entire phenomenon. In Experiment 2 similarly the neutral condition increases in favorability. It may well be as Fechner predicted, that there is a maximal rate after which the enhancement effect no longer operates. The equivocal results make any judgment of the merits of either hypothesis largely conjectural. Koh (1965) has demonstrated that intensity of affectivity is a prothetic judgment and is related to the power law wherein the difference limit increases at a constant rate. This experiment used rates of exposures based on a log function, the results of which are suggestive of a trend in support of enhancement. Further the experimental design included provisions for intervals between different stimulus

presentations to minimize the effect attributable to continuous stimulation. In addition the response measure used was one of stimulus recognition. Deese (1963) has commented that recall is production plus some discrimination, while recognition is only discrimination. It would appear that stimulus familiarization in combination with the processing of the stimulus trace into storage, both of which are consequences of higher frequencies of exposure, have much in their favor as possible interpretations of the process involved in the change of attitudes.

Implications

The lack of anticipated results limits the scope of any recommendations to bald statements as to which pitfalls subsequent investigation should be wary of, and hopefully avoid. The selection of emotionally-toned words is a matter requiring considerable judgment. The context can effect such words, and their meaningfulness under rates of exposure is more skittish than desirable. There should be some equalization of their meaningfulness over all levels of affect. The use of a more sophisticated model--a mathematical model of the kind formulated by Bernback (1965) suggests itself as a possibility--would enable the investigator to determine the loci of attitude formation under various conditions for individual subjects. This would also permit some insight into the kinds of subjects who fail the requirements of the task and would provide a method of control over the guessing rate. It seems not implausible to investigate in this fashion the genesis and modification of attitudes during the use of teaching machines. With some Ss the problem of attention span becomes critical: in these experiments eighty-one exposures of three CS-UCS pairs within a short time period seemed to stupify them. Nor can the manner of

presentation be slighted. Although E shifted the stimuli on the stand after each block, the fact that necessity compelled him to reach toward one section more frequently than others aided at least one S. The latter admitted that he had more associations on the basis of where the card was coming from. The specification of the stimuli needs greater precision. Information theory has provided the procedures which facilitate the generation of stimuli of known quantitative differences. A pilot group of Ss could rate these artificial stimuli on an attitude scale of the equal-interval type. Such preliminary steps would provide an informational and an evaluative scale value for each stimulus.

The enhancement effect is subtle, evanescent. Its ubiquity and immediacy belie the difficulties inherent in its production under laboratory conditions. It will continue to elude investigators unless the most stringent conditions of experimentation prevail.

CHAPTER SIX

SUMMARY

This study hypothesized that, during the process of formation of affective associations of positive, neutral, and negative value, frequency of exposure would influence in a more favorable direction the rated "goodness" of these associations. The associated stimuli, a Chinese character (CS) and an adjective (UCS) paired in a classical conditioning paradigm, served as the learning task for Ss in two experiments. The frequency of exposure varied over four treatment categories at rates of 1, 3, 9, and 27 presentations of the CS and UCS contiguously. The results indicated that there was an enhancement effect operative with indifferent success. The differences between means failed to become significant at a recombination of the two rates of exposure (1 and 3 presentations) into a category designated "high". By inspection the curves for the combined data appeared to have parallel slopes which increased in a positive direction. The test of the hypothesis for row effects was significant. This led to the conclusion that affective associations though differing in a linear trend from one level to another did not receive significantly higher ratings of "goodness" at higher frequencies of exposure in the two experiments reported.

The theoretical background to the study included a reformulation of attitude structure in terms of belief and a mediational response equated with the evaluative aspect of attitude. Further impetus to the inception of the study came from a consideration of the research

on the relationship between frequency, word value, and visual recognition threshold. Under high rates of exposure previous research had demonstrated correlations between lower visual recognition thresholds and higher ratings of words in terms of "goodness", as well as between ratings of "goodness" and word usage.

A form of classical conditioning, *voluntary instructed conditioning*, served as a model for the arrangement of the experiment. There were twelve Chinese characters and twelve adjectives of known affective values paired in every possible combination. Each Chinese character appeared under every treatment and affective level in Experiment 1. In Experiment 2 the characters, randomly assigned to two groups, appeared at alternating rates of exposure with the adjectives constituting the CSs under every condition.

The two-way analysis of variance repeatedly attained significant overall F ratios for row (affective value) effects at the .01 level of significance. The results of the analysis did not permit the rejection of no column or interaction effects. Differences in mean "goodness" ratings between low and high rates of exposures failed to attain significance at any level.

The interpretation of the results stressed the probable importance of stimulus familiarization and memory storage as explanations for the phenomena observed. The implications of the research called attention to the need for a reconsideration of the techniques involved in isolating the phenomenon, and suggested additional methods for its investigation.

APPENDIX A

Instructions to Subjects

INSTRUCTIONS TO SUBJECTS

You are here today to participate in a learning experiment. Your task will be to learn to associate a certain Japanese character and a word. This is a sample character with a word on its reverse side. (Show the card which contains the sample character and its accompanying word.) First of all, you are to study carefully the form or design of the character. During the experiment after a suitable interval I shall show you the reverse side of the card, which has the word on it. You are to look at the word, recall as best you can the design of the character just seen, then you are to pronounce the word aloud. We shall practice this procedure. (Demonstrate and practice.) Are there any questions? (Pause)

You are now about to begin the experiment proper. The series of characters is consecutive and there are no rest periods planned. (Begin with the first card on the schedule.) Here is the first character.

(At the conclusion of the trial period, say) On this sheet of paper you should indicate how you feel about the characters you have just seen. This sheet has twelve scales on it labeled I LIKE IT and I DISLIKE IT. In my hand there is a practice scale with a practice figure (Show the practice figure and scale). Notice that the closer you place the check-mark to I LIKE IT indicates the more you like it; the closer you place it to I DISLIKE IT means the less that you like it. I shall show you the characters again, but without the words. As you recognize a character, you are to place your checkmark on the scale indicated by the number that corresponds to that character. Use your other hand to keep your place on the correct scale. You will have the same amount of time in which to respond as you did in which to learn the character. Are there any questions? (Pause) Here is character number one, etc. (Experiment 2) Now you will do the same for the words. Here is word number one, etc.

APPENDIX B

Block Designs--Experiment 1

Block Designs--Experiment 2

Block Designs--Experiment 1

Block Designs: Block 1

Valence	Rate of Presentation			
	1	3	9	27
Positive	BN	AM	CO	DP
Neutral	HT	FR	GS	EQ
Negative	JV	IU	LX	KW

Block Designs: Block 2

Valence	Rate of Presentation			
	1	3	9	27
Positive	EP	CN	DO	BM
Neutral	FQ	GR	HS	IT
Negative	LW	JU	KV	AX

Block Designs: Block 3

Valence	Rate of Presentation			
	1	3	9	27
Positive	CM	DN	EO	FP
Neutral	GQ	HR	IS	JT
Negative	KU	BX	AW	LV

Block Designs: Block 4

Valence	Rate of Presentation			
	1	3	9	27
Positive	DM	EN	FO	GP
Neutral	IR	KT	JS	HQ
Negative	AV	LU	BW	CX

Block Designs: Block 5

Valence	Rate of Presentation			
	1	3	9	27
Positive	HP	FN	GO	EM
Neutral	JR	IQ	LT	KS
Negative	BV	AU	CW	DX

Block Designs: Block 6

Valence	Rate of Presentation			
	1	3	9	27
Positive	FM	GN	HO	IP
Neutral	LS	JQ	KR	AT
Negative	EX	CV	DW	BU

Block Designs: Block 7

Valence	Rate of Presentation			
	1	3	9	27
Positive	GM	HN	IO	JP
Neutral	KQ	BT	AS	LR
Negative	CU	DV	EW	FX

Block Designs: Block 8

Valence	Rate of Presentation			
	1	3	9	27
Positive	IN	KP	JO	HM
Neutral	AR	LQ	BS	CT
Negative	DU	EV	FW	GX

Block Designs: Block 9

Valence	Rate of Presentation			
	1	3	9	27
Positive	JN	IM	LP	KO
Neutral	BR	AQ	CS	DT
Negative	HX	FV	GW	EU

Block Designs: Block 10

Valence	Rate of Presentation			
	1	3	9	27
Positive	LO	JM	KN	AP
Neutral	ET	CR	DS	BQ
Negative	FU	GV	HW	IX

Block Designs: Block 11

Valence	Rate of Presentation			
	1	3	9	27
Positive	KM	BP	AO	LN
Neutral	CQ	DR	ES	FT
Negative	GU	HV	IW	JX

Block Designs: Block 12

Valence	Rate of Presentation			
	1	3	9	27
Positive	AN	LM	BO	CP
Neutral	DQ	ER	FS	GT
Negative	IV	KX	JW	HU

Block Designs - Experiment 2

Block Designs: Block 1

Valence	Rate of Presentation			
	1	3	9	27
Positive	AM	LN	KO	JP
Neutral	IQ	HR	GS	FT
Negative	EU	DV	CW	BX

Block Designs: Block 2

Valence	Rate of Presentation			
	1	3	9	27
Positive	KP	BM	AN	LO
Neutral	GT	JQ	IR	HS
Negative	CX	FU	EV	DW

Block Designs: Block 3

Valence	Rate of Presentation			
	1	3	9	27
Positive	AO	LP	CM	BN
Neutral	IS	HT	KQ	JR
Negative	EW	DX	GU	FV

Block Designs: Block 4

Valence	Rate of Presentation			
	1	3	9	27
Positive	CN	BO	AP	DM
Neutral	KR	JS	IT	LQ
Negative	GV	FW	EX	HU

Block Designs: Block 5

Valence	Rate of Presentation			
	1	3	9	27
Positive	EM	DN	CO	BP
Neutral	AQ	LR	KS	JT
Negative	IU	HV	GW	FX

Block Designs: Block 6

Valence	Rate of Presentation			
	1	3	9	27
Positive	CP	FM	EN	DO
Neutral	KT	BQ	AR	LS
Negative	GX	JU	IV	HW

Block Designs: Block 7

Valence	Rate of Presentation			
	1	3	9	27
Positive	EO	DP	GM	FN
Neutral	AS	LT	CQ	BR
Negative	IW	HX	KU	JV

Block Designs: Block 8

Valence	Rate of Presentation			
	1	3	9	27
Positive	GN	FO	EP	HM
Neutral	CR	BS	AT	DQ
Negative	KV	JW	IX	LU

Block Designs: Block 9

Valence	Rate of Presentation			
	1	3	9	27
Positive	IM	HN	GO	FP
Neutral	EQ	DR	CS	BT
Negative	AU	LV	KW	JX

Block Designs: Block 10

Valence	Rate of Presentation			
	1	3	9	27
Positive	GP	JM	IN	HO
Neutral	CT	FQ	ER	DS
Negative	KX	BU	AV	LW

Block Designs: Block 11

Valence	Rate of Presentation			
	1	3	9	27
Positive	IO	HP	KM	JN
Neutral	ES	DT	GQ	FR
Negative	AW	LX	CU	BV

Block Designs: Block 12

Valence	Rate of Presentation			
	1	3	9	27
Positive	KN	JO	IP	LM
Neutral	GR	FS	ET	HQ
Negative	CV	BW	AX	DU

APPENDIX C

Sample Presentation Order

Sample Presentation Order

Block Designs: Order 4

Number	Stimulus	Number	Stimulus	Number	Stimulus	Number	Stimulus
1	FO	31	CX	61	CX	91	GP
2	CX	32	GP	62	HQ	92	BW
3	JS	33	FO	63	FO	93	JS
4	GP	34	CX	64	GP	94	CX
5	BW	35	HQ	65	CX	95	JS
6	GP	36	LU	66	GP	96	CX
7	FO	37	GP	67	HQ	97	GP
8	LU	38	HQ	68	CX	98	HQ
9	FO	39	GP	69	GP	99	CX
10	CX	40	CX	70	HQ	100	DM
11	BW	41	GP	71	CX	101	CX
12	HQ	42	HQ	72	GP	102	HQ
13	CX	43	GP	73	HQ	103	GP
14	BW	44	CX	74	CX	104	FO
15	HQ	45	GP	75	GP	105	JS
16	BW	46	HQ	76	HQ	106	CX
17	HQ	47	CX	77	CX	107	HQ
18	KT	48	GP	78	FO	108	GP
19	GP	49	HQ	79	CX	109	HQ
20	CX	50	FO	80	HQ	110	GP
21	IR	51	HQ	81	CX	111	HQ
22	HQ	52	JS	82	GP	112	CX
23	AV	53	KT	83	CX	113	EN
24	GP	54	JS	84	JS	114	HQ
25	CX	55	kt	85	HQ	115	JS
26	BW	56	GP	86	GP	116	BW
27	EN	57	BW	87	LU	117	GP
28	HQ	58	CX	88	HO	118	FO
29	BW	59	GP	89	GP	119	HQ
30	HQ	60	EN	90	CX	120	JS

APPENDIX D

Stimulus Figures with Rated Values

STIMULUS FIGURES WITH RATED VALUES

Practice 

A  5.50

D  6.31

B  4.20

E  5.35

C  5.85

F  6.60

Stimulus Figures With Rated Values (Continued)

G  4.44

J  6.10

H  5.85

K  4.40

I  5.86

L  6.10

APPENDIX E

Rated Values and Thorndike-Lorge Frequencies

RATED VALUES AND THORNDIKE-LORGE FREQUENCIES

Verbal responses	Values		Frequencies	
	Anderson	Noble's *e**	T-L	K-R**
M thoughtful	5.29	1.97	15	3
N intelligent	5.37	2.20	27	7
O wise	5.28	2.27	AA	17
P interesting	5.11	1.93	A	5
Average value	5.26			
Q quiet	3.11	2.57	A	57
R solemn	2.89	2.83	20	3
S cautious	3.34	2.90	8	5
T ordinary	2.66	2.17	A	0
Average value	3.00			
U obnoxious	.48	3.03	2	3
V phony	.27	3.10	13/4 mil.	5
W insincere	.66	3.03	16/4 mil.	0
X annoying	.84	3.03	4	0
Average value	.56			

*N = 30, $e = /1(f_n) + 2(f_p) + 3(f_u) + 4(f_m)$

APPENDIX F

Exp. 1: Three-Way Analysis of Variance for CS-UCS

Exp. 2: Three-Way Analysis of Variance for CS-UCS

EXP. 1: THREE-WAY ANALYSIS OF VARIANCE FOR CS-UCS

Source	df	SS	MS	F	p[1]
Between subjects	35	*689.08*			
A (Blocks)	11	159.91	14.54		
Subj. w. groups [error (a)]	24	529.17	22.05		
Within subjects	396	*3073.58*			
B (Affective Value)	2	108.01	54.01	6.28	.025
AB	22	304.83	13.86		
B x Subj. w. groups [error (b)]	48	412.49	8.60		
C (Rate of Exposure)	3	29.02	9.67	4.08	.10
AC	33	578.36	17.53	8.85	.01
C x subj. w. groups [error (c)]	72	142.72	1.98		
BC	6	37.60	6.27		
ABC	66	33.45	5.07		
BC x subj. w. groups [error (bc)]	144	26.95	10.16		

[1]Conservative Test (Winer, 1962, p. 322)

EXP. 2: THREE-WAY ANALYSIS OF VARIANCE FOR CS-UCS

Source	df	SS	MS	F	p[1]
Between subjects	35	*694.14*			
A (Blocks)	11	236.42	21.49		
Subj. w. groups [error (a)]	24	457.72	19.07		
Within subjects	396	*2890.00*			
B (Affective Value)	2	118.77	59.38	6.73	.05
AB	22	302.03	13.73		
B x subj. w. groups [error (b)]	48	423.20	8.82		
C (Rate of Exposure)	3	14.86	4.95		
AC	33	228.08	6.91		
C x subj. w. groups [error (c)]	72	469.73	6.52		
BC	6	36.87	6.15		
ABC	66	613.25	9.29		
BC x subj. w. groups	144	683.35	4.75		

[1]Conservative Test (Winer, 1962, p. 322)

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