THE ATTITUDINAL EFFECTS OF MERE EXPOSURE

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Abstract

The hypothesis is offered that mere repeated exposure of the individual to a stimulus object enhances his attitude toward it. By "mere" exposure is meant a condition making the stimulus accessible to the individual's perception. Support for the hypothesis consists of four types of evidence, presented and reviewed: (a) the correlation between affective connotation of words and word-frequency; (b) the effect of experimentally manipulated frequency of exposure upon the affective connotation of nonsense words and symbols; (c) the correlation between word-frequency and the attitude to their referents; (d) the effects of experimentally manipulated frequency of exposure on attitude. The relevance for the exposure-attitude hypothesis of the stimulus satiation theory, of the discrepancy theory, and of the semantic satiation findings were examined.

The Attitudinal Effects of Mere Exposure[1]

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This paper examines the general hypothesis that more repeated exposure of the individual to a stimulus is a sufficient condition for the enhancement of his attitude toward it. By "mere exposure" I mean a condition which just makes the given stimulus accessible to the individual's perception.

Even though the hypothesis seems to be in conflict with such celebrated laws as Familiarity breeds contempt and Absence makes the heart grow fonder, it is not particularly original or recent (Fechner, 1876, pp. 240-243; James, 1890, p. 672; Maslow, 1937; Meyer, 1903; Pepper, 1919). The foremost proponent of this hypothesis, the advertising industry, has always attributed to exposure formidable advertising potential. But--apparently, in respect for the law of enhancement by association--it seldom dared to utilize mere exposure. The product, its name, or its hallmark, are always presented to the public in contiguity with most attractive stimuli. At the same time, however, the advertising industry also likes to warn against overexposure, relying, it would appear, on the above law of familiarity (Erdelyi, 1940; Wiebe, 1940).

It isn't altogether clear just what evidence supports these advertising principles. And direct evidence that attitudes are enhanced by mere exposure or mere contact with the stimulus object is scant. Moreover, it is the product of antiquated methods, and almost all of it concerns

music appreciation (Downey & Knapp, 1927; Krugman, 1943; Meyer, 1903; Moore & Gilliland, 1924; Mull, 1957; Verveer, Barry, & Bousfield, 1933; Washburn, Child, & Abel, 1927). The problem of attitudinal contact effects has also been of some interest in the study of interracial attitudes (Cook & Selltiz, 1952). But these studies have invariably examined the effects not of mere contact between people, but of processes considerably more complex: prolonged social interaction, group interdependence, cooperation, etc., (Deutsch & Collins, 1951; Kramer, 1950; MacKenzie, 1948; Wilner, Walkley & Cook, 1952). Although the independent variables in these studies have generally been featured under the labels "contact" and "exposure", the effects they report cannot, because of confounding with a multitude of other events, and with reinforcement in particular, be regarded as produced alone by contact or exposure. Thus, it has been known for some time that social interaction enhances the attitudes of interactors toward each other (Bovard, 1951; Festinger, 1951; Homans, 1961; Newcomb, 1963). But it is not known just what contribution to the relationship between social interaction and attitudes is made by mere exposure on the one hand, and by the variety of psychologically significant processes that accompany mere exposure during the course of social interaction, on the other,

The main empirical support for the exposure hypothesis comes, therefore, not from work on interaction, interracial attitudes, or attitudes in general, but from an entirely different and seemingly unrelated area of research. It comes from some recent work on word frequencies. This recent research shows that there exists an intimate relationship between

word frequency and meaning. And this relationship, in my opinion (for which I shall later present support), is a special case of the more general relationship between mere exposure and attitude enhancement.

The strength and pervasiveness of the relationship between word frequency and meaning--the evaluative aspect of meaning, in particular--is truly remarkable. If there is any correspondence between the frequency with which words are used and the actual preponderance of the things and events for which these words stand, then we may congratulate ourselves on living in a most happy world. According to the Thorndike-Lorge count (1944), the word HAPPINESS occurs 761 times, UNHAPPINESS occurs only 49 times. BEAUTY is to be found at least 41 times as often as UGLINESS, and WEALTH outdoes POVERTY by a factor of 1.6. We LAUGH 2.4 times as often as we CRY; we LOVE almost seven times more often than we HATE; we are IN at least five times more often than we are OUT; UP twice as often as we are DOWN; much more often SUCCESSFUL than UNSUCCESSFUL; and we FIND things 4.5 times more often than we LOSE them - all because most of us are LUCKY (220) rather than UNLUCKY (17).

We have all the reasons in the world to be HAPPY (1449) and GAY (418) rather than SAD/and GLOOMY (72), for things are five times more often GOOD than BAD, almost three times more often POSSIBLE than IMPOSSIBLE, and about five times more PROFITABLE than UNPROFITABLE. That is, perhaps, why BOOM and PROSPERITY outdo RECESSION by a factor of just about thirty, ABUNDANCE outdoes SCARCITY by at least three to one, and AFFLUENCE is six times more prevalent than DEPRIVATION. Catering to our corporeal sensibilities, things are three times more often FRAGRANT than they are FOUL,

(202)

twelve times more often FRESH than STALE, and almost seven times more often SWEET than SOUR, and everything that can be filled is three times as often FULL as it is EMPTY. If we have anything we have MORE of it six times more often than we have LESS of it[2], and three times more often MOST of it than LEAST of it. And these things that we have so frequently more of are five times more often BETTER than they are WORSE, six times more often BEST than WORST, and four times more often SUPERIOR than INFERIOR. Still, they IMPROVE at least twenty-five times as often as they DETERIORATE.

These examples suffice to convince one that the world represented by a one-to-one correspondence with word-frequencies is as unreal as it is spectacular. Bitterly aware of it, Sartre (1964) confessed in his autobiography, "...as a result of discovering the world through language, for a long time, I took language for the world" (p. 182).

But, while they are unfaithful in representing reality, word-frequencies are extraordinarily accurate in representing real values: words that stand for good, desirable, and preferred aspects of reality are more frequently used.

It isn't entirely clear who discovered this remarkable relationship between word-frequency and the evaluative dimension of word meaning. Postman (1953) seems to be one of the early workers to note its generality, while Howes and Solomon (1950) observed in their critique of McGinnies' (1949) perceptual defense experiment that the so-called "taboo" words he used as stimuli, are particularly infrequent. However, the first systematic research effort that demonstrates the word-frequency word-value

relationship is due to Johnson, Thomson, and Frincke (1960). These authors were the first to collect empirical data showing that words with "positive" meaning have higher frequency counts than words with "negative" meanings. They have also gathered experimental evidence showing that the repeated use of a nonsense word tends to enhance its rating on the GOOD-BAD scale of the semantic differential. Johnson, Thomson, and Frincke have not tried to explain either of these two aspects of the frequency-value relationship, being primarily concerned with its implications for the study of word-recognition thresholds.

This paper examines the frequency-value relationship, proposing that it is considerably more pervasive and general than implied by the Johnson-Thomson-Frincke results, and that it is, moreover, a special case of a broader and more basic phenomenon: the enhancement of attitudes by mere repeated exposure. I shall first review evidence on the correlation between word frequency and word value, and between stimulus frequency and attitude. Experimental evidence on these two relationships, and on the likely causal direction will then be examined.

Word Frequency-Word Value: Correlational Evidence

Johnson, Thomson, and Frincke (1960) obtained correlations of .63, .40, and .38 between the L-count (Thorndike & Lorge, 1944) and the GOOD-BAD scale values for three samples of randomly chosen words. In a further attempt, they constructed 30 pairs each consisting of one frequent and one infrequent word. These pairs were given to a group of Ss with the instructions to "encircle the most pleasantly toned word of each pair". In 87% of the pairs the majority of Ss endorsed the more frequent word.

Finally, 64 nonsense syllables of low, medium, and high association were rated by a group of Ss on the GOOD-BAD scale of the semantic differential. Johnson, Thomson, and Frincke report a clear relationship between association value and "GOODNESS" ratings. The rationale of this study invoked the assumed relationship between association of the given nonsense syllable and the probability of occurrence of the corresponding letter combination in meaningful words (Underwood, 1959).

In an attempt to examine the generality of this phenomenon we studied the scale values of 154 antonym pairs. First, a large pool of antonym pairs was amassed. From this pool all symmetric[3] pairs were chosen in the following manner. For each antonym pair ten judges, one at a time, were asked to give the antonym of one member of the pair. Ten other judges--independently of the first ten--were asked to give the antonym of the other member of the pair. Only those pairs were retained about which the twenty judges showed unanimous agreement with the dictionary sources. A list of 154 antonym pairs was thus obtained. These were given to 100 Ss, all college students, for judgments as to which member had "the more favorable meaning, represented the more desirable object, event, state of affairs, characteristic, etc.". A different random order of the antonym pairs was given to each S, and the lateral positions of the members of each pair were reversed at random for half of the group.

Table 1 shows the list of these 154 antonym pairs, together with the

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Insert Table 1 about here

"desirability" and the frequency data (the Thorndike-Lorge L-count). The

preferred member of each pair is always listed first. The "desirability" figures are simply the percentages of subjects choosing the left member of the pair as the preferred alternative.

It is of some interest, however incidental, that there is considerable agreement about desirability of the meanings. On half of the items the agreement exceeded 95 percent. Agreement is high even for words which are not genuinely evaluative. For instance, 97 of the 100 students preferred ON to OFF, 98 preferred ADD to SUBTRACT, 96 ABOVE to BELOW, and 92 UPWARD to DOWNWARD.

For the overwhelming majority of the items the preferred word is also the more frequent one. Only 28 of the 154 antonym pairs (18 percent) show a negative relationship between frequency and desirability. Moreover, these "reversals" occur primarily for antonym pairs on which there is relatively little agreement. For pairs with agreement greater than 95 percent (i.e., the upper half of the list) there are only six reversals out of the 77 possible. It is significant that in three of these six antonym pairs, the less desirable member (which in these cases is the more frequent one) has more meanings and linguistic uses than the more desirable one. INVALID means both NOT VALID and CRIPPLE, but VALID is just VALID. EARLY is only an adjective, while LATE is both an adjective and an adverb. FRONT is a noun, a verb, and an adjective, while BACK is all that and an adverb to boot.

Toward the end of the list where the desirability preferences are divided fairly evenly between the two members of the antonym pairs, the frequencies of the two antonyms often are nearly the same. PLAY is

preferred to WORK only by a majority of two (a sad commentary on the contemporary college population!) and the respective frequency counts of these antonyms are 2606 and 2720. The HOT-COLD preference is 55 to 45 and their frequency counts 1006 and 1092. The HUSBAND-WIFE preference is 58 to 42 and their respective frequencies 1788 and 1668.

Three antonym items about which agreement was complete or nearly complete show a curious pattern of results. They are GOOD-BAD (5122:1001), BETTER-WORSE (2354:450), and BEST-WORST (1850:292). Since BETTER is presumably better than GOOD, WORSE worse than BAD, and since BEST is presumably better than BETTER, and WORST worse than WORSE, we would expect the greatest separation between the frequencies of BEST and WORST, smallest between the frequencies of BEST and WORST, smallest between the frequencies of GOOD and BAD, and medium between the frequencies of BETTER and WORSE. Since absolute differences are deceiving, we best take the ratios of the frequencies, which are 6.34, 5.23, and 5.12 for BEST-WORST, BETTER-WORSE, and GOOD-BAD respectively. It is indeed the case that the frequency ratios increase from GOOD-BAD to BEST-WORSE. However, if frequency reflects "desirability", we would also expect the frequency of BEST to exceed the frequency of BETTER, and that of BETTER to exceed the frequency of GOOD. In fact, GOOD is more frequent than BETTER, and BETTER more frequent than BEST! But is BETTER better than GOOD? In an extensive study of meanings Mosier (1941) found that GOOD was consistently rated as better than BETTER. "Startling as this may appear to grammarians" Mosier says, "it is psychologically sound, since GOOD is a positive assertion, whereas BETTER implies comparison with some standard which might,

in many cases, be itself unfavorable. Compare the often heard comment, 'He is getting better, but he is still far from good' " (p. 134).

For purposes of comparison the frequencies of French, German, and Spanish equivalents of some of the antonyms examined are given in Table 2 below.

Insert Table 2 about here

Systematic data on indigenous desirability ratings are unfortunately not available, but it would be surprising if the French, German, and Spanish judgments differed from those obtained in the United States. An informal inquiry among foreign visitors marshalled a good deal of support for this conjecture. Comparing the data in Tables 1 and 2, the agreement is rather striking. In 15 out of the 44 cases the frequency relation in the antonym pairs is the same in the three foreign languages as in English: the more favorable item is more frequent, a result exceeding chance expectation by a large margin. The results in Table 2, furthermore, give a ready expression to our favorite ethnic prejudices. The relatively low frequency of the two Romance equivalents of EARLY and the high frequency of these equivalents of LATE, in comparison to their Germanic counterparts, make generalizations about national character tempting, as does the relatively low frequency of the German equivalent of REWARD. The foreign equivalents of ANSWER-QUESTION, HOT-COLD, IMPORT-EXPORT, PEACE-WAR, etc., however, show patterns of differences that may reflect more than superficial linguistic idiosyncrasies.

Several questions can immediately be raised about the above results. First, are these figures up to date? The Thorndike-Lorge count is based

on samples of material published during the late twenties and the early thirties. The German equivalents come from a source dating to the late nineteenth Century (Käding, 1898). The French count was published in 1929 (Van der Beke, 1929), and the Spanish in 1927 (Buchanan, 1927). Secondly, do these results reflect general verbal habits? Word counts are based on printed material alone. Do people show the same linguistic predilections in ordinary speech as they do in writing? Admittedly, both questions indicate caution in generalizing from the above results. But this caution needn't be excessive. Howes (1954) has recently asked Harvard and Antioch undergraduates to estimate the probabilities of the various words. The correlations between the students' estimates of several word samples and the L-count of the Thorndike-Lorge source varied around .80. There is also evidence from word association studies which shows that word counts do reflect general verbal habits of the population. A word which has a high frequency of occurrence in print is also a highly probable associate. The association norms to 200 words were recently collected by Palermo and Jenkins (1964) from a sample of 4,500 school children and college students in Minneapolis. The list of the 200 stimulus words represents a systematic sample of verbs, nouns, pronouns, adverbs, adjectives, participles, etc., all having fairly high frequency on the Thorndike-Lorge counts. Since in the word association task each subject makes one response to each stimulus word, Palermo and Jenkins collected from their subjects 900,000 word responses. Among them GOOD occurred 4890 times, BAD only 1956. The response RIGHT was given 477 times, the response WRONG only 100 times. FULL was found 431

times among the associations, EMPTY only 62 times. STRONG was given 557, WEAK 96 times. TOGETHER occurred 575 times, APART 29 times. LIGHT was a response 8655 times (n.b. some subjects must have given it more than once), DARK 4274 times. But as in the case of the Thorndike-Lorge count, FRONT occurred 22 times, while BACK occurred 265 times; RICH was given 36 times, while POOR was a response 95 times. NEAR was given 981 times, FAR 1218. COMING was given 166 times, GOING 714 times. And, as in L-count, PLAY and WORK showed 791 and 957 occurrences, respectively.

However, the best evidence about the relationship between verbal habits and the evaluative aspect of meaning is found in a recent study by Siegel (1960), although it wasn't the purpose of the study to explore this relationship. Siegel's experiment dealt with the effects of verbal reinforcement on the emission of words differing in affective connotation and in frequency. Eighteen six-letter words of known frequencies and previously judged on the GOOD-BAD and the PLEASANT-UNPLEASANT scales were selected from a larger sample. Six of these words were of high frequency (100 and more in one million), six of medium (20 to 30), and six of low frequency (1 to 5). Within each frequency class two words were previously judged to be "good", two "neutral" and two "bad". Three groups of Ss, other than those involved in the affective judgments, participated in the experiment, each having to deal with six words of the same frequency. The procedure consisted of presenting the S with the list of six words, all high, medium, or low in frequency, depending on the condition in which he was in, and giving him at the same time a stack of cards on which appeared illegible six-letter "words". Ostensibly, each card contained one of the 6 words in the subjects' list. Actually, the "words"

consisted of random sequences of six letters, printed over several thicknesses of paper and one carbon. Their "legibility" was further reduced by placing each card in an onionskin paper envelope. The Ss' task was to "read" or to guess what word appeared on each card. Of interest for the present purposes are the first fifty trials which served to establish operant rate, and during which, of course, no reinforcement of any sort was given. Table 3 shows data on the guessing

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Insert Table 3 about here

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behavior of Siegel's Ss as a function of word frequency and affective connotation. Reported in each cell is the average number of times a word of a given frequency and affective value was used as a guess during the 50 operant trials. Since there are six words to choose from, 8.33 represents a chance response rate. It is clear, however, that both frequency and affective connotation displace response rate away from the chance level. High frequency seems to result in overcalling, and low frequency in undercalling. But it is striking to discover that affective connotation had an even stronger effect on response emission, the marginals for that variable showing a somewhat greater range of differences.

Some words in the language have primarily an evaluative function. These words should show the frequency-value relationship with particular clarity. Several instances of this relationship are examined.

Let us first consider the scales of the Semantic Differential (Osgood, Suci, & Tannenbaum, 1957). We have chosen only those scales which have high and relatively pure loadings on one of the 3 main factors, evaluation,

potency, and activity. Table 4 shows the polar opposites of these scales, together with their frequencies according to the Thorndike-Lorge L-count.

Insert Table 4 about here

The left-hand polar opposites in the three columns are the favorable, potent, and active ends of the scales. It is significant that among the nineteen evaluative scales the favorable polar opposite has always higher frequency than the unfavorable opposite. For the scales which do not load high on the evaluative factor the high frequencies are divided fairly evenly among the potent and non-potent opposites. In nine of the 15 potency scales the highly potent end of the scale is more frequent. In three of the 8 activity scales the active polar opposite is more frequent.

There are two other instances of a high correlation between frequency and value for adjectives. Gough (1955) has given the items of his Adjective Checklist to 30 judges who rated each adjective for favorability. The most favorable and the least favorable quartiles of Gough's Checklist are reported in his publication. The average word frequency of the upper quartile is 140, and of the lower quartile 48. In another study a list of 555 adjectives was examined for the frequency-value relationship. These 555 adjectives were used by Anderson (1964) in his work on impression formation. The list was constructed out of a large sample of items. The 555 selected items were given by Anderson to a group of 100 Ss with the instructions to rate on a seven-point scale "how much you yourself would like the person described by

that word." The correlation between these likeability ratings and the logarithm of the Thorndike-Lorge L-count is .83[4]. Figure 1 shows this

Insert Figure 1 about here

relationship graphically, where means of log frequencies are plotted for six categories of adjectives in increasing order of favorability. Considering that the reliabilities of the Thorndike-Lorge count and of Anderson's favorability ratings are less than perfect, this coefficient of correlation is particularly impressive.

Miller, Newman, and Friedman (1958) have shown that word frequency is a negative function of word length. The problem immediately arises, therefore, as to which of these two variables is critical for word value and word meaning. In order to examine this possible confounding between frequency and word length, the above correlation was recomputed holding the number of letters constant. No appreciable change in the previously obtained coefficient was observed. The correlation between word length and Anderson's favorability ratings was -.0006.

The relationship between word frequency and word length is explained in terms of the principle of least effort. Words that require considerable effort in writing and in speech are less likely candidates for use. Frincke and Johnson (1960) have, therefore, asked subjects to choose the "most pleasantly toned word" from each of 108 homophone pairs. The greatest majority of these pairs consisted of words of the same word length, and all pairs, of course, consisted of words that required the

same effort in uttering them, Out of 3132 possible choices, the more frequent member of the pair was chosen 1836 times.

Dixon and Dixon (1964) have given a list of 200 verbs (in past-tense form) to 60 female and 60 male judges who rated them on an 11-point GOOD-BAD scale. The instructions were to rate what "kind of impression S thought a psychologist would get of him when he used each verb in a sentence." These impression ratings have correlations with log frequencies (the Thorndike-Lorge L-count) equal to .48 for females and to .50 for males. But it must be pointed out that these coefficients represent correlations severely attenuated by unreliability of the frequency variable. The Thorndike-Lorge count lists verbs in the present-tense form. If an adjectival form of the verb exists, then it is also listed. In computing correlation coefficients we used, therefore, only the present-tense frequencies.

Miron (1961) had American and Japanese Ss rate a sample of three-element phonetic combinations on the various scales of the Semantic Differential. The Ss also rated these stimulus materials for their familiarity. It is interesting that the correlations between familiarity and the composite of evaluative scales were .59 and .50 for the American and the Japanese samples, respectively. But the correlations of familiarity with the composites of the potency and activity factors were low and negative.

As a final example of the relationship between word frequency and the evaluative aspect of meaning, two poems by William Blake are called to the reader's attention:

Infant Joy

"I have no name:
I am but two days old,"
What shall I call thee?
"I happy am,
Joy is my name."
Sweet joy befall thee!

Pretty joy!
Sweet joy but two days old,
Sweet joy I call thee:
Thou dost smile,
I sing the while,
Sweet joy befall thee!

Infant Sorrow

My mother groaned! My father wept;
Into the dangerous world I leapt;
Helpless, naked, piping loud,
Like a fiend hid in a cloud.

Struggling in my father's hands,
Striving against my swadling bands,
Bound and weary I thought best
To sulk upon my mother's breast.

In these two poems, expressing opposite qualities of affect, the frequencies of the critical words (i. e., words which convey the major content, and hence not articles, pronouns, or auxiliary verbs) were averaged. The average frequency of Infant Joy is 2037. The average for Infant Sorrow is 1116. Two formally similar verses, one by Browning and the other by Shelley, show the same pattern:

Song, R. Browning

The year's at the spring,
And day's at the morn;
Morning's at seven;
The hillside's dew-pearled;
The lark's on the wing;
The snail's on the thorn;
God's in his Heaven --
All's right with the world'

Dirge, P. B. Shelley

Rough wind, that moanest loud
Grief too sad for song;
Wild wind, when sullen cloud
Knells all the night long;
Sad storm, whose tears are in vain,
Bare woods, whose branches strain,
Deep caves and dreary main --
Wail, for the world's wrong.

The average word frequency of Browning's poem is 1380. The poem by Shelley--which comes to a rather different and sadder conclusion--has an average frequency of 728.

Stimulus Frequency-Attitude: Correlational Evidence

We may now turn to the more general question of the effect of exposure on attitude, still limiting ourselves to correlational studies.

Here, less evidence exists, and the evidence which is available is often indirect. But the results are quite similar to those just reviewed. For instance, Alluisi and Adams (1962) found a correlation of .843 between the preference subjects expressed for the appearance of letters and their frequency in the language. Strassburger and Wertheimer (1959) had Ss rate for "pleasantness" nonsense syllables varying in association value. Higher association values consistently received higher "pleasantness" ratings. Wilson and Becknell (1961) and Braun (1962) successfully replicated these results. Braun also found that eight-letter pseudo-words, varying in their order of approximation to English (Miller, 1951) show the same pattern. These two studies differ from the similar ones by Johnson, Thomson, and Frincke, discussed earlier, in that Ss in the former ones were asked to judge how pleasant were the stimuli themselves, or how much Ss liked them (Wilson and Becknell, 1961), while in the latter whether they meant something close to GOOD or close to BAD.

In 1947 the National Opinion Research Center conducted an extensive survey on the "prestige" of various occupations and professions. Nearly 100 occupational categories were rated for "general standing". Twenty-four of these occupations are labeled by single words, such as PHYSICIAN, SCIENTIST, JANITOR, etc. The remainder is described less economically: OWNER-OPERATOR OF A PRINTING SHOP, or TENANT FARMER--ONE WHO OWNS LIVESTOCK AND MACHINERY AND MANAGES THE FARM. Thus, one is able to determine the frequency of usage for only a part of this list--the 24 single-word occupations. The correlation between rated occupational prestige of these twenty-four items and the log of frequency of usage is .55.

Similar to the ratings of occupational prestige are the social distance ratings of ethnic and racial groups, first developed by Bogardus (1925) over 30 years ago. Recent replications show that these social distance ratings enjoy remarkable stability (Bogardus, 1959). The correlation between the so-called "racial-distance quotients", which are numerical equivalents of these ratings, and the log frequency of usage of these ethnic labels is .33.

In order to explore relationships of this sort further, I have selected ten countries whose names are found in the Thorndike-Lorge L-count, and whose frequencies can be arranged in increasing order in approximately constant log units. These countries were then given to high-school students with the instructions to rank-order them in terms of liking. Table 5 shows the average rank each country received and its frequency of usage according to the L-count. There seems to be no question

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Insert Table 5 about here

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about the frequency-attitude relationship. The correlation between the average preference ranks and frequency ranks is .89. The same relationship is found with American cities. Selected were ten cities that (a) are listed in the Thorndike-Lorge L-count, and (b) can be arranged in increasing order of frequency in approximately constant log units. University students were asked how much they would like to live in each of these ten cities. Their task, specifically, was to rank-order these cities according to their preferences "as a place to live". The average

ranks, together with frequency counts of these ten cities, are shown in Table 5. The rank correlation between frequency and average preference is .85.

Other subjects, also high-school students in the Midwest, were asked to rate on a seven-point scale how much they like various trees, fruits, vegetables, and flowers. In each case ten items were selected that were listed in the Thorndike-Lorge count and that could be ordered according to a constant log frequency unit. Table 6 shows both the average ratings (0 = DISLIKE; 6 = LIKE) and the frequency counts for the four types of items. The rank correlations between the frequency and average attitude are .84, .81, .85, and .89, for trees, fruits, vegetables, and flowers respectively.

Insert Table 6 about here

Of course, word counts do not faithfully represent the frequencies with which one encounters the above items. And it is difficult to discover precisely how often the average Midwestern high-school student encounters a yew, a cowslip, or a radish. But a fair index of frequency of exposure can be found in farm production data. For seven of the vegetables in Table 6 farm production figures for 1963 are available, and they are shown below in thousands of tons:

CORN (4.17)	2,340.9
POTATOES (4.13)	13,777.1
LETTUCE (4.00)	1,937.6
CARROTS (3.57)	843.8
ASPARAGUS (2.33)	187.8
CAULIFLOWER (1.96)	123.4
BROCCOLI (1.96)	123.9

Included also (in brackets) are average preference ratings of these seven vegetables. The rank correlation between the production figures and the average preference ratings is .96.

This impressive correlation coefficient, like those we observed above, may not relfect the effect of frequency on attitude but the effect of attitude on frequency. Thus, it can be argued that many roses are grown because people like roses. But it can also be argued that people like roses because there are many roses growing. There is less ambiguity, however, with regard to the correlation between frequency of letters and the preference for their appearance (Alluisi & Adams, 1962). There aren't so many E's in English just because we like the way E's look.

Of course, the hypothesis offered here would not be disproved even if the above correlational studies reflected only the effect of attitude on exposure. The existence of this latter effect does not in any way preclude the possibility of an effect of exposure on attitudes. A large quantity of corn is produced because Americans like corn. But there is nothing <u>intrinsically</u> attractive in corn. Many European peoples

shudder at the thought of eating it. Nor do they see much of it. The taste for corn is a matter of social learning, and the frequency of our exposure to it is in all probability an important factor in our taste for it. This sort of argument suggests for a given society a stable system of food preference, with tastes and production having mutually enhancing effects upon each other. And indeed, our preferences for foods, flowers, trees, vegetables, and fruits didn't change for centuries, as one can gather from sixteenth and seventeenth century literature and painting. Still, until there is experimental evidence, the question of which is the cause and which the effect remains a matter of conjecture. We shall now turn, therefore, to such experimental evidence.

Exposure--meaning: Experimental Evidence

The first experimental study on the relationship between exposure and word meaning was carried out by Johnson, Thomson, and Frincke (1960). These authors first asked Ss to rate a number of nonsense words on the GOOD-BAD scale of the semantic differential. The Ss were then instructed that "this is an experiment concerning the effectiveness of repetition in learning to pronounce strange words correctly." Some of these words were shown once, others twice, five times, or ten times. Ss were required to look at these words and to pronounce them on each presentation. Following this training procedure the words were again rated on the GOOD-BAD scale. A significant exposure effect was obtained by Johnson, Thomson, and Frincke, with the words shown frequently increasing on the evaluative scale. Strangely, however, words which were seen only once in training were judged afterwards not quite as "GOOD" as before

training. Thus, as a result of two, five, and ten exposures words improved in meaning, and as a result of but one exposure they deteriorated. This result might be an artifact of the before-after procedure used by Johnson, Thomson, and Frincke.

Our experiment used the same stimuli which, incidentally, came from the familiar experiment by Solomon and Postman (1952) on the effects of word frequency on recognition threshold. The specific experimental aims were also the same as those of Johnson, Thomson, and Frincke. But our design differed from theirs in several respects. In the Johnson-Thomson-Frincke experiment the same words always appeared in the same frequencies to all Ss. Thus, the word JANDARA, for instance, was given ten times to each S, and the word MECBURI was given once to each S. It is possible that the effects these authors obtained are not due to the frequency manipulation alone, but that they depend on the stimulus material with which the frequency variable was fully confounded. In our study words and training frequencies were, therefore, counterbalanced in a latin square design. Because words and the number of exposures were counterbalanced an after-only design could be employed, requiring no pre-measures. The effects of repeated exposure could be observed by comparing for each word the favorability rating it received after having been exposed during training once, twice, five times, etc.

Our experiment differs from that of Johnson, Thomson, and Frincke (1960) in two additional respects. In their experiment the subjects' task following training was to rate each word on the GOOD-BAD scale. First, in the present experiment Ss were told after training that the

words they just learned to pronounce were Turkish adjectives, and that their next job would be to guess their meaning. They were not required "to guess this meaning exactly, but it would suffice" if they indicated on a seven-point GOOD-BAD scale whether each of these words meant something GOOD or something BAD, and to what extent. Second, in addition to the four different frequencies of exposure used by Johnson, Thomson, and Frincke, the zero-frequency and the frequency of 25 exposures were employed in our experiment.

The results of this experiment are shown in Figure 2, and in Figure 3. In Figure 2 are shown the average ratings of "goodness" for the six frequencies plotted on a log scale. Each point is based on 144 observations. It is clear, from these results, that a strong and unequivocal effect of exposure was obtained. Figure 3 shows that the exposure effect is independent of the content. The ratings of "goodness" were averaged for each word when it was given during training with the lower frequencies of 0, 1, and 2 (hatched bars) and when it was given with the higher frequencies of 5, 10, and 25 (solid bars). Ss consistently rated

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Insert Fig.s 2 and 3 about here

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the given word to mean something "better" if they had seen it (and had said it) more often. This effect is true for all 12 words used in the experiment.

Since the hypothesis proposed above holds that mere exposure is a sufficient condition of attitude change, the above procedure is not the best for testing its validity. In particular, Ss in the above experiment are required to pronounce the nonsense words during training. In order

to further reduce their active participation during the course of manipulating exposure, the following experiment was carried out.

To meet the requirements of the definition of "mere exposure" Chinese characters were substituted for the nonsense words. The Ss were again told that the experiment dealt with the learning of a foreign language, but now they were not required to pronounce the characters. Nor--because of their ignorance of Chinese--were they able to pronounce them subvocally. They were simply instructed to pay close attention to the characters whenever they were exposed to them. In all other respects the experiment was identical to the one employing nonsense words. Now, too, following training Ss were told that the characters stood for adjectives, and that their task was to guess their meaning on the GOOD-BAD scale. Characters and exposures were again counterbalanced. Figures 2 and 4 show the results, and it is obvious that the exposure-favorability

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Insert Figure 4 about here

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relationship previously found with nonsense words obtains even if the individual's exposure to the stimulus consists of his passively looking at it for a period of about two seconds. Figure 4 shows that the exposure effect is found for all stimuli but one.

Amster and Glasman (1965) report a negative result using a procedure similar to that employed by Johnson, Thomson, and Frincke (1960). The experiment was similar in all respects except that meaningful English words were substituted for the nonsense stimuli. No exposure effect was observed by Amster and Glasman for these meaningful words. But this finding is not

at all surprising. Nor is it especially significant for the understanding of exposure effects. Adding one more occasion (or even ten more occasions) to see and say a perfectly well-known English word to all the times this word had been seen and uttered by the individual in the past --a figure often in the thousands--really shouldn't have much effect on the meaning he attributes to it. The expectation of a change in the evaluative aspect of meaning as a function of ten additional exposures becomes even less reasonable when we consider that the change in affective connotation is a linear function of the logarithm of frequency, as we noted in Figures 1 and 2. The difference in the total exposure of a word said 1000 times and one said 1010 times is indeed negligible.

Exposure-attitude Relationship: Experimental Evidence

In all the experiments above the question asked of the subjects in rating the stimuli following exposure dealt with the evaluative aspect of their meaning. The subjects were never required to say just how much they "liked" the nonsense words or Chinese characters. In all probability, the results would have been the same if they were asked directly to state their attitude toward these words and characters, and the Wilson-Becknell (1961) results support this conjecture. But because their stimuli were essentially verbal in nature, Ss' answers could in these studies be strongly influenced by semantic factors. This would have been less likely, of course, in the case of Chinese characters than in the case of nonsense words.

As I mentioned in the Introduction, there is some direct evidence on the attitudinal effects of mere exposure, dealing almost exclusively with

music appreciation. Meyer (1903), for example, played to his students oriental music 12 to 15 times in succession. In most cases the students' introspective protocols indicated a better liking for the pieces on the last than on the first presentation. One of the students who took part in Meyer's experiment (H. T. Moore), and who showed enhancement effects of repeated exposure ("I liked the last time better than the first, because I became more used to the successive chords") followed up this work in a study of his own twenty years later. Moore and Gilliland (1924) played to their students jazz and classical records once a week for twenty-five weeks. Liking for classical records increased, but no change was found for jazz music. Similar results are reported by other writers (Krugman, 1943; Verveer, Barry, & Bousfield, 1933; Washburn, Child, & Abel, 1927). Downey & Knapp (1927) played to 33 students a variety of musical selections (e.g., Tschaikowsky's Marche Slave, Massenet's Meditation from "Thais", Columbia, The Gem of the Ocean, etc.) once a week for five weeks. All pieces of music except one (Columbia, The Gem of the Ocean) became better liked at the close of the sessions. Alpert (1953) presented Ss with sounds having unfamiliar rhythms. His Ss found these sounds at first unpleasant. After repeated presentations, however, the liking for them increased. Additional exposures of Ss to the tones resulted in increasing indifference on the part of the listeners. More recently, Mull (1957) found that upon repeated exposure to their music subjects enjoy Schoenberg and Hindemith more.

In the area of visual arts, Pepper (1919) found that repeated exposure resulted in more positive esthetic judgments of unusual color combinations. Krugman and Hartley (1960), however, using famous paintings, could only

find ambiguous results. Maslow (1937) projected for four days in succession 15 paintings of great masters. Six days following the last presentation the 15 paintings were presented once again, and interspersed among them were fifteen others (matched for the artist) which the Ss have never seen. The results indicated a greater liking for the familiar paintings. Maslow (1937) also made tests of preference, frequently with similar results, for other familiar and unfamiliar objects, such as rubber bands, paper clips, blotters, pens, pencils, etc. A similar experiment to the one with paintings, but using instead Russian girls' names, showed the same results. The same subjects were used in all these studies and the sessions took place in the same room, the subjects always sitting in the same chairs. Toward the end of the testing program Maslow asked if anyone would like to change seats. No one did, preferring, apparently, to remain in the familiar one.

Although the results of the above studies are fairly consistent, the conditions under which they were carried out make their conclusions somewhat less than compelling. In the majority of instances, the conditions of the repeated exposure were quite ambiguous. The experiments were usually conducted in classes, the instructor serving as E. Ss often responded aloud, thus being able to influence each other's judgments and opinions. Prior to the sessions E often expressed his own preferences. The stimuli repeatedly shown, were not always exposed under the same conditions, and the material, exposures, and sequences, were seldom counterbalanced.

Becknell, Wilson, and Baird (1963) have recently reported more convincing support for the exposure-attitude hypothesis. Slides of nonsense

syllables were presented with different frequencies (1, 4, 7, and 10). Following this exposure training (which also included interspersed presentations of slides with landscapes and with ads) Ss (all females) were given pairs of boxes containing nylon stockings, and they were asked to choose the "brand" they preferred. These "brands" corresponded to the nonsense syllables previously shown, and they were printed on the boxes. Each S received two different pairs of boxes for comparison. The paired-comparison data showed a clear tendency of Ss to prefer the box marked by the more frequent syllable. Again, however, the semantic component is not excluded from the effects obtained in these two studies.

There is one more item of evidence, somewhat indirect, on the problem of the effects of exposure. In a study by Munsinger (1964) Ss were given the opportunity to present to themselves CVC trigrams whose association value, evaluation scale value, and prepotency score (Mandler, 1955) were previously assessed. By pressing a response key the S would expose in a small window a trigram which he would then have to spell. The rate at which he key-pressed constituted the dependent measure. In one of Munsinger's experimental groups Ss could expose to themselves by means of that key-response trigrams that were matched for association and prepotency. All these trigrams, however, previously scored low on the evaluative scales of the semantic differential. After Ss reached an asymptotic key-pressing rate, the experimental conditions changed such that now the Ss' response would expose trigrams that were high in evaluation, although they were still matched for association and prepotency.

A significant increase in response rates is reported by Munsinger following the change in the affective value of the trigrams. Again, however, the semantic component is not entirely excluded from the effects obtained in these two studies.

Because they are less a matter of semantic factors, we have chosen to manipulate by means of exposure interpersonal attitudes. Using the same experimental design as with the Chinese characters, faces of men (photographs of graduating Michigan State University seniors taken from the MSU Yearbook) were employed as attitude objects. The experiment was introduced to Ss--all students at the University of Michigan--as dealing with the problem of "visual memory." Following the exposure manipulation, which consisted of presenting each photograph a different number of times for a period of two seconds, Ss were asked to rate on a 7-point scale how much they might like the man on each photograph "as a person". The results of this study are shown in Figures 5 and 6. While the exposure effect is not as clear as previously (only 9 of the 12 stimuli show it), it is still rather impressive ($F = 9.96$; $df = 5/770$; $p < .001$).

Insert Figures 5 and 6 about here

The Word-frequency--Word-value Relationship as a Special Case of the Exposure-attitude Relationship

In the first section of this paper some evidence was presented suggesting that words with positive affective connotations are used more frequently (both in print and in speech) than words with negative affective connotations. In the second section evidence was given to suggest that the

affective connotation of a word improves with their repeated use. Because the second item of evidence rests on experimental proof, in which the frequency of usage was systematically and independently manipulated, one cannot question the causal direction implied in these data. But finding that the frequency of usage affects meaning needn't necessarily preclude the possibility that meaning determines the frequency of usage. It is necessary therefore to examine more closely the results on the correlational evidence between word-frequency and word value.

Why are positive words used more frequently? Besides the rather wistful and unlikely explanation that there are more positive than negative referents (i.e., we live in a paradise), one real possibility suggests itself. The evidence reviewed so far deals only with usage per word. The totality of "good" and "bad" usage, however, depends on the numbers of different "good" and "bad" words in the language. It is entirely possible, therefore, that the superiority of "good" words in frequency per word exists side by side with the superiority of "bad" words in their greater variety. This possibility receives some support from the fact that in English (and in a host of other languages) prefixes and suffixes that serve to negate or reverse meaning, such as ANTI, DE, IM, IN, IR, LESS, UN, etc., are most commonly attached to words having a positive connotation. Once attached to a word they almost universally form a word with a negative affective connotation. Positive words with these prefixes or suffixes are exceptional: UNSELFISH, INDEPENDENT, are some examples.

It would appear, therefore, that there are indeed more negative than positive words. And if there are more different negative words, the usage

per word would naturally be attenuated for these words, because the total usage would be distributed among a larger universe of items.

Norman[5] has asked a group of students to separate a large sample of adjectives into "good" ones and "bad" ones. On the average 2.31 more items were placed in the "bad" pile than in the "good" pile. The frequency figures in Table 1 above show a pattern consistent with Norman's independent finding. The average frequency of the preferred antonyms is 2.3 times larger than the average frequency of the non-preferred antonyms! Therefore, for the material considered here, the ratio of total positive and negative usage is equal to unity.

If repeated usage enhances the affective meaning of words, a relatively large supply of negative words would in fact be needed. It would be equally reasonable to expect that there exist devices in language protecting words from a deterioration of meaning. It is entirely possible that the prefixes and suffixes discussed above serve this function. Because the negative qualities of these prefixes and suffixes are independent of their referents, because they are essentially abstract, and because they derive their negativity from the semantic function they perform, words formed by means of these prefixes and suffixes are perhaps better able than root-words to resist an enhancement of affective connotation as a result of repeated usage. I was unable to find evidence corroborating this point of view, although there is a good deal of philological literature on both positive changes in meaning (see for instance VanDongen, 1933) and negative changes in meaning (see, for instance,

Schreuder, 1929). Most of the sources, however, consider changes in meaning of root words only.

If there are any remaining doubts that frequency of words is a function of the value of their referents, then the following frequencies of a few well chosen but significant words should once and for all dispel them:

PSYCHOLOGIST	36
CHEMIST	32
ECONOMIST	32
SOCIOLOGIST	14
ASTRONOMER	12
GEOLOGIST	9
PHYSICIST	8
GEOGRAPHER	7
BOTANIST	6
BIOLOGIST	5

The Exposure--attitude Hypothesis and Related Theoretical Issues

While evidence that the word-frequency--word-value relationship is a special case of the exposure--attitude relationship is admittedly less than clear, it is also a matter of some conjecture if the latter is as general, universal, and basic as may have been implied. Are all attitudes enhanced by mere repeated exposure? Is there a number of repetitions beyond which attitude begins to become negative? Does this number vary systematically across attitude objects? Are these effects stable? Of course, these and like questions can only be answered by further

empirical work. We can now only review and evaluate theoretical arguments that support the hypothesis in its general form, or that are in conflict with it.

Let us first consider a possible biological survival value of an exposure-enhancement mechanism. A stimulus presented for the first time evokes in the organism an instinctive fear reaction. Lorenz (1956) noted that a young raven, "confronted with a new object, which may be a camera, an old bottle, a stuffed polecat, or anything else, first reacts with escape responses. He will fly up to an elevated perch, and, from this point of vantage, stare at the object literally for hours. After this he will begin to approach the object very gradually..." Bühler, Hetzer, and Mabel (1928) observed that human infants react to a strange sound by crying out with fear. Upon the second exposure of the sound stimulus, movement and vocalization that indicated displeasure were observed. On the third exposure, the infants listened to the sound showing some signs of attention, but did not seem to show any displeasure. On the fourth exposure, they looked in the direction of the sound with detectable interest. These facts, of course, are borne out by common observation. Hunt (1965) reports that young infants he observed preferred a familiar mobile to a new one.

The survival value of such a reflex is obvious. But there is no direct evidence that all organisms are equipped with an avoidance reaction occurring upon the encounter of a novel stimulus, and that this reaction is instinctive. However, if we assume that this is the case, then the exposure-attitude hypothesis becomes quite reasonable. The first

encounter with the novel stimulus produces fear reaction. If no negative consequences are associated with this first encounter, the avoidance reaction upon the second encounter will naturally be weaker. If such encounters continue, and if no other events--negative in their consequences for the organism--accompany these encounters, then the organism's attitude toward the stimulus must improve. To be sure, the hypothesis does not deny or preclude the effects of reinforcement. The exposure of a stimulus coupled with reward will strengthen the animal's approach behavior; and the exposure of stimulus coupled with a noxious event will strengthen his avoidance reactions. But in the absence of reward or punishment, mere exposure will result in the enhancement of the organism's attitude toward the given stimulus object.

There are research findings and theoretical formulations that appear to be in conflict with the above hypothesis. They are in the areas of curiosity and exploratory behavior on the one hand, and of spontaneous alternation and stimulus satiation on the other. In his excellent review of the literature on curiosity and exploration Berlyne (1960) clearly shows that, given a choice, an animal will tend to turn toward a novel stimulus rather than toward a familiar one. These results, however, deal with the animal's <u>exploratory</u> and <u>orienting</u> behavior, which is not a fair index of his attitude toward the explored object. The exploration of a novel object does not in itself indicate that the animal <u>prefers</u> (in the attitudinal sense of this word) the novel object to a familiar one. Moreover, experiments on exploratory behavior are commonly given in terms of the total amount of approach or exploratory behavior observed

over some interval of time. Just what happens on the very first presentation of the novel stimulus is not entirely clear from the results these experiments report. While there appear to be some conditions under which the organism will prefer to "approach" novel stimuli to familiar ones--(Berlyne, 1950; Berlyne, 1955; Berlyne & Slater, 1957; Dember & Milbrook, 1956; Montgomery, 1953; Thiessen & McGaugh, 1958; Thomson & Solomon, 1954), it remains to be determined whether these "approach" responses are accompanied by positive affect, or whether they are cautious exploratory reactions by means of which the animal assesses whether the novel situation is a safe one. For instance, Kivy, Earl, and Walker (1956) have shown to rats two arms of a maze which they could not enter because of glass partitions placed in front. Both arms were black (or both white). After the pre-exposure period one arm had been changed from black to white (or from white to black), the partitions were removed, and the rats were allowed to enter the arm of their choice. The findings showed that there was a greater probability of entering the arm whose albedo was changed. Moreover, the alternation effect was found to be considerably stronger when the pre-exposure period was extended from one minute to 15 to 30 minutes. But do these results indicate that the rats "liked" the changed arm better? Or did they enter the arm to explore it for possible dangers?

The implications of the spontaneous-alternation research for the exposure -- attitude hypothesis have a similar ambiguity. The findings in this area seem to indicate that when the animal has two response alternatives, e. g., two routes to the same goal, he will tend to alternate

his responses on successive occasions (see Dember & Fowler, 1958, for a thorough review). Glanzer (1953) proposed that this phenomenon is due to what he called stimulus satiation. Stimulus satiation occurs, according to Glanzer, when the animal continues to be exposed to a given stimulus and, as a consequence, his tendency to respond to this stimulus in the habitual way diminishes.

Stimulus alternation and stimulus satiation phenomena will constitute negative evidence for the exposure--attitude hypothesis if it can be shown that the alternation behavior of the animal is a symptom of his changing attitude. Because most of this work involves animal experimentation, it is difficult to make unequivocal inferences about attitudes. The experimenters in this area do tend to use such terms as "prefers", "likes", "chooses", etc. But the typical experimental results only show that, given two alternative responses of equal instrumental value, the animal will tend under some conditions to alternate between them.

Another set of data which might also be of some consequence for the exposure-attitude hypothesis are those in the area of semantic satiation. In a typical semantic satiation experiment the subject is asked to repeat a word as many times as he can during a period of 15 seconds. The general findings in this area indicate that following this sort of rapid repetition the word seems to "lose" its meaning (for a review of the literature see Amster, 1964). Loss of meaning is measured by a departure from polarity on semantic differential scales, such as GOOD-BAD, STRONG-WEAK, etc. (Lambert & Jakobovits, 1960). When repeated in rapid

succession and rated on some semantic differential scale, immediately thereafter the words tend to be placed neither toward one (e. g., GOOD) nor the other (e. g., BAD) end of the scale, but are rated toward the neutral point of the scale. While several studies have demonstrated a reduction of polarization following rapid repetition of a word (Das, 1964; Kanungo & Lambert, 1963a; 1963b; Messer, Jakobovitz, Kanungo, & Lambert, 1964; Warren, 1961a, 1961b) there is an equal amount of conflicting evidence (Amster & Glasman, 1965; Floyd, 1962; Reynierse & Barch, 1963; Schulz, Weaver, & Radtke, 1965). A reduction of polarity of positive words as a result of repetition would indeed be embarrassing for the exposure-attitude hypothesis. But the conflicting results make the case for semantic satiation far from settled, and a problem for further research.

Relevant to the exposure-attitude hypothesis is also the McClelland-Atkinson-Clark-Lowell (1963) discrepancy theory. These authors argue that the rating of pleasantness of a stimulus depends on the recent and on the past experiences of the organism with it. Given a second experience with a particular stimulus dimension, "positive affect is the result of smaller discrepancies of a sensory or perceptual event from the adaptation level of the organism: negative affect is the result of larger discrepancies". Alpert (1963) exposed Ss for some period of time to a homogeneous field of red light. Following this period of adaptation a spot in the center of the field was made more or less intense and judgments of pleasantness of this spot were collected. Alpert's results gave partial, but not unequivocal, support to the McClelland-Atkinson-Clark-Lowell discrepancy hypothesis. Similar results are reported by Haber (1958)

who used thermal stimuli. The exact implications of the discrepancy hypothesis cannot be fully evaluated. One of the difficulties is that the discrepancy hypothesis is not entirely clear about the meaning of "adaptation level". At times "adaptation level" is taken to mean the stimulus the animal has been exposed to immediately prior to the stimulus which he is asked to rate for pleasantness. At times, however, the "adaptation level" is interpreted as the product of lengthy and cumulative experience of the organism with the critical stimulus dimension. The implications of the first formulation are entirely consistent with the exposure-attitude hypothesis. The implications of the second formulation must await the further clarification of the concept of "adaptation level" as used by McClelland-Atkinson-Clark-Lowell. On the other hand, the results on the relationship of exposure to meaning and attitude seem to do some damage to the discrepancy theory. The data reviewed here show rather consistently a systematic increase in pleasantness as a function of exposure, i. e., familiarity. Perhaps the exposures in these experiments were insufficiently frequent to result in a stable adaptation level. Perhaps a decrement in favorability will be obtained if the number of exposures is further increased. However, the results shown in Figure 1 which sample words varying in frequency from one to several thousands, and the antonym data in Table 1, in which frequencies vary from 2 to over 75,000 in 4 1/2 million, and in which the frequency ratios of the compared antonyms vary from .17 to 336.33, do not show that there is a tendency to prefer moderate frequencies, nor to prefer moderate differences in frequencies.

Conclusion

The balance of the experimental results reviewed and reported in this paper is in favor of the hypothesis that mere repeated exposure of an individual to a stimulus object enhances his attitude toward it. But, as yet, the account books cannot be closed. Further research must examine the boundary conditions of the exposure-attitude relationship, for it is possible that the neat linear log-frequency--attitude relationship, repeatedly observed here, may well break down under some conditions. This future research must, in particular, concentrate on the effects of extreme frequencies of exposure, on duration of exposure, on inter-exposure intervals, and on many other similar parameters of mere exposure. This research must also assess the applicability of the exposure-attitude relationship to a greater variety of stimulus objects. The question of generalization of specific exposure effects is of equal theoretical importance. Does repeated exposure to a given stimulus result in the enhancement of attitudes toward similar stimuli?

Mere exposure is a necessary pre-condition of a vast variety of experimental manipulations. For example, in attempts to change attitudes by means of persuasive communications the attitude object is mentioned repeatedly, regardless of whether the attempt is directed toward making the attitude more favorable or toward making it less favorable. Making attitudes more favorable should, therefore, be easier than making them less favorable. It is interesting that studies on the effectiveness of persuasion in attitude change seldom try to effect a negative change, and almost never compare the relative success of a pro-persuasion with the success of a con-persuasion. A theory of attitude change that is

based on experimental evidence of change in only one direction will be severely limited.[6]

The partial reinforcement manipulation, too, is subject to possible confounding with the number of stimulus presentations. Erlebacher and Archer (1961), for instance, report the curious result that at the completion of training greater numbers of correct responses were associated with smaller percentages of reinforcement. However, in the various conditions of reinforcement subjects worked until they performed in succession a predetermined number of correct responses, the same for all percentages of reinforcement. Therefore, percentage of reinforcement was in this study completely confounded with the number of stimulus exposures (and also with the number of reinforcements). Although many authors have tried to cope with this confounding in one way or another (e. g., Festinger, 1961; Kanfer, 1954; O'Connell, 1965), the methodological difficulties have not been completely overcome. None of the four variables that are associated with the partial-reinforcement effect--percent of reinforced trials, number of trials, number of positive reinforcements, number of non-reinforcements--can be studied independently of all the others.

The problem of exposure effects is an important one because it is basic. Its solution will have significant consequences for other problems, both in its theoretical and methodological implications.

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Footnotes

[1]I wish to thank Christine Linder, Dik van Kreveld, and James J. Taylor for their invaluable assistance in carrying out various phases of the experimental work. I am also indebted to Elinore Cottrell and Prof. Robert P. Weeks for making their students available as judges and subjects.

[2]N.b.: The MORE-LESS ratio in this text is 7:1 up to now.

[3]One finds in the course of this endeavor that the antonymic relation is seldom symmetric. According to the standard sources, if Y is listed as the antonym of X, then chances are that not X but Z is listed as the antonym of Y. For instance, in the 1960-edition of Webster's New Collegiate Dictionary, EXTEND is given as the antonym of CONTRACT. Looking up EXTEND we find, however, that its antonym is REDUCE. The antonym of REDUCE, on the other hand, is INCREASE. The antonym of INCREASE is DECREASE, the antonym of DECREASE is AMPLIFY, the antonym of AMPLIFY is CONDENSE, and the antonym of CONDENSE is EXPAND. We can ultimately close the circle, because CONTRACT, according to this source, is the antonym of EXPAND.

[4]Items for which there was no frequency information in the Thorndike-Lorge count were not included in computing this coefficient. These items were primarily of the hyphenated form, such as OPEN-MINDED, GOOD-HUMORED, WELL-SPOKEN, FAULT-FINDING, ULTRA-CRITICAL, WISHY-WASHY, etc.

[5]Warren T. Norman, personal communication.

[6]The one-sidedness of attitude change research is due to one or both of two factors: (a) the social-action interest of early attitude studies, or (b) the relative greater ease of changing attitudes in the positive direction, which was hypothesized above.

Table 1

Semantic Preference and Frequency of 154 Antonym Pairs

Percentage Agreement	Preferred Alternative (a)	Non-Preferred Alternative (b)	Frequency of (a)	Frequency of (b)
100	ABLE	UNABLE	930	239
100	ATTENTIVE	INATTENTIVE	49	4
100	BETTER	WORSE	2354	450
100	ENCOURAGE	DISCOURAGE	205	147
100	FRIENDLY	UNFRIENDLY	357	19
100	HONEST	DISHONEST	393	41
100	POSSIBLE	IMPOSSIBLE	1289	459
99	ADVANCE	RETREAT	452	105
99	BEST	WORST	1850	292
99	CLEAN	DIRTY	781	221
99	COMFORTABLE	UNCOMFORTABLE	348	112
99	FAVORABLE	UNFAVORABLE	93	25
99	GOOD	BAD	5122	1001
99	GRATEFUL	UNGRATEFUL	194	13
99	PEACE	WAR	472	1118
99	PRESENT	ABSENT	1075	65
99	PURE	IMPURE	197	4

(Table continued on next page)

Table 1 continued

99	RESPONSIBLE	IRRESPONSIBLE	267	30
99	REWARD	PUNISHMENT	154	80
99	RIGHT	WRONG	3874	890
99	SMILE	FROWN	2143	216
99	TOLERANT	INTOLERANT	42	13
99	VICTORY	DEFEAT	118	166
98	ADD	SUBTRACT	2018	6
98	ADVANTAGE	DISADVANTAGE	404	41
98	AGREEABLE	DISAGREEABLE	58	43
98	CAPABLE	INCAPABLE	176	30
98	DESIRABLE	UNDESIRABLE	160	42
98	FIND	LOSE	2698	593
98	FORTUNATE	UNFORTUNATE	136	108
98	FORWARD	BACKWARD	736	139
98	FRIEND	ENEMY	2553	883
98	HIGH	LOW	1674	1224
98	HONORABLE	DISHONORABLE	58	8
98	KIND	UNKIND	1521	34
98	LEGAL	ILLEGAL	180	34
98	LIFE	DEATH	4804	815
98	LOVE	HATE	5129	756
98	MATURE	IMMATURE	91	17
98	MORAL	IMMORAL	272	19
98	PLEASANT	UNPLEASANT	457	114
98	POLITE	IMPOLITE	115	3

(Table continued on next page)

Table 1 continued

98	RELIABLE	UNRELIABLE	78	9
98	SUCCESS	FAILURE	573	262
98	VALID	INVALID	22	56
98	VOLUNTARY	INVOLUNTARY	28	26
97	ADEQUATE	INADEQUATE	95	59
97	COMPETENT	INCOMPETENT	69	23
97	FOUND	LOST	2892	1074
97	IMPORTANT	UNIMPORTANT	1130	40
97	LIKELY	UNLIKELY	364	25
97	ON	OFF	30224	3644
97	PATIENCE	IMPATIENCE	139	39
97	PATIENT	IMPATIENT	392	79
97	PATIENTLY	IMPATIENTLY	85	82
97	POPULAR	UNPOPULAR	418	12
97	POSITIVE	NEGATIVE	92	28
97	PROFITABLE	UNPROFITABLE	57	12
97	PROMOTE	DEMOTE	90	2
97	REMEMBER	FORGET	1682	882
97	SATISFACTORY	UNSATISFACTORY	154	32
97	WILLINGLY	UNWILLINGLY	66	13
96	ABOVE	BELOW	941	529
96	ACTIVE	PASSIVE	186	29
96	EARLY	LATE	1022	2859
96	FRONT	BACK	1094	6587
96	FULL	EMPTY	1129	395

(Table continued on next page)

Table 1 continued

96	LIVE	DIE	4307	1079
96	PRESENCE	ABSENCE	277	163
96	PROBABLE	IMPROBABLE	64	14
96	RATIONAL	IRRATIONAL	33	9
96	REASONABLE	UNREASONABLE	155	56
96	RESOLUTELY	IRRESOLUTELY	30	4
96	STRONG	WEAK	770	276
96	SUCCEED	FAIL	264	620
96	SUPERIOR	INFERIOR	166	40
96	TIMELY	UNTIMELY	27	6
95	ACCEPT	REJECT	667	51
95	DIRECT	INDIRECT	416	23
95	INCLUDE	EXCLUDE	533	38
95	INCREASE	DECREASE	781	86
95	MOST	LEAST	3443	1259
95	PRACTICAL	IMPRACTICAL	340	12
95	REGULARLY	IRREGULARLY	122	5
95	RICH	POOR	656	857
95	WEALTH	POVERTY	243	146
94	APPROVE	DISAPPROVE	171	45
94	CONSCIOUS	UNCONSCIOUS	299	116
94	LEADER	FOLLOWER	373	45
94	OBEDIENT	DISOBEDIENT	70	4
94	TOGETHER	APART	1835	276
93	AGREEMENT	DISAGREEMENT	143	21

(Table continued on next page)

Table 1 continued

93	CERTAIN	UNCERTAIN	800	107
93	FIRST	LAST	5154	3517
93	MAJOR	MINOR	366	83
93	NORMAL	ABNORMAL	335	43
93	REGULAR	IRREGULAR	340	44
93	UNSELFISH	SELFISH	32	137
93	UPWARDS	DOWNWARDS	9	40
93	WIDE	NARROW	593	391
92	MORE	LESS	8015	1357
92	NOW	THEN	7665	10208
92	UP	DOWN	11718	5534
92	UPWARD	DOWNWARD	111	27
92	VISIBLE	INVISIBLE	110	74
92	YES	NO	2202	11742
91	ALWAYS	NEVER	3285	5715
91	FAMILIAR	UNFAMILIAR	345	39
91	MAXIMUM	MINIMUM	43	86
91	OPTIMISM	PESSIMISM	28	11
90	AGREE	DISAGREE	729	38
90	NECESSARY	UNNECESSARY	715	107
90	OVER	UNDER	7520	2961
90	SWEET	SOUR	679	102
90	WHOLE	PART	1663	1585
89	LIGHT	DARK	2387	1005
88	DEEP	SHALLOW	881	104

(Table continued on next page)

Table 1 continued

88	SMOOTH	ROUGH	346	294
86	WHITE	BLACK	2663	1083
85	IN	OUT	75253	13649
85	INDEPENDENT	DEPENDENT	134	18
84	FAST	SLOW	514	434
83	COMEDY	TRAGEDY	126	189
83	FASTEN	UNFASTEN	142	16
79	DAY	NIGHT	4549	3385
78	DRY	WET	592	319
78	LONG	SHORT	5362	887
78	UNSHAKEN	SHAKEN	6	83
77	USUALLY	UNUSUALLY	718	91
74	UPSTAIRS	DOWNSTAIRS	314	226
72	INNER	OUTER	143	97
72	INTERIOR	EXTERIOR	185	48
70	NEAR	FAR	1338	1835
70	UNLIMITED	LIMITED	43	67
68	INSIDE	OUTSIDE	656	921
68	WRAP	UNWRAP	293	17
67	INFINITE	FINITE	71	2
67	INTERNAL	EXTERNAL	36	26
65	COMING	GOING	1486	4623
64	INFORMAL	FORMAL	64	166
63	ANSWER	QUESTION	2132	1302
63	MEN	WOMEN	3614	2552

(Table continued on next page)

Table 1 continued

61	DIFFERENT	SAME	1194	1747
59	INWARD	OUTWARD	43	54
59	MAN	WOMEN	7355	2431
58	HUSBAND	WIFE	1788	1668
58	USUAL	UNUSUAL	516	273
57	OFFENSE	DEFENSE	86	223
55	HOT	COLD	1006	1092
55	IMPORT	EXPERT	86	88
55	INWARDLY	OUTWARDLY	32	33
54	INCONSPICUOUS	CONSPICUOUS	33	59
52	PLAY	WORK	2606	2720
51	MORTAL	IMMORTAL	54	26

Table 2

Frequency Ranks of English, French, German, and Spanish Antonym Pairs

ENGLISH*	FRENCH	GERMAN	SPANISH
ABLE(3)	CAPABLE(3)	FÄHIG(4)	CAPAZ(3)
UNABLE(9)	INCAPABLE(4)	UNFÄHIG(11)	INCAPAZ(7)
ACCEPT(3)	ACCEPTER(2)	ANNEHMEN(2)	ACCEPTAR(3)
REJECT(9)	REJETER(5)	ABLEHNEN(5)	RECHAZAR(5)
ACTIVE(6)	ACTIF(6)	TÄTIG(5)	ACTIVO(6)
PASSIVE(14)	PASSIF(?)	UNTÄTIG(?)	PASIVO(10)
ANSWER(2)	RÉPONSE(4)	ANTWORT(3)	RESPUESTA(4)
QUESTION(3)	QUESTION(2)	FRAGE(2)	PREGUNTA(4)
BETTER(2)	MEILLEUR(2)	BESSER(2)	MEJOR(2)
WORSE(4)	PIRE(5)	SCHLECHTER(?)	PEOR(2)
CERTAIN(2)	CERTAIN(2)	SICHER(2)	CIERTO(2)
UNCERTAIN(9)	INCERTAIN(10)	UNSICHER(9)	INCIERTO(9)
CLEAN(3)	PROPRE(2)	SAUBER(9)	LIMPIO(3)
DIRTY(7)	SALE(7)	SCHMUTZIG(12)	SUCIO(6)
COMEDY(9)	COMÉDIE(6)	KOMÖDIE(9)	COMEDIA(4)
TRAGEDY(9)	TRAGÉDIE(9)	TRAGÖDIE(11)	TRAGEDIA(8)
COMFORTABLE(5)	À L'AISE(4)	BEQUEM(5)	CÓMODO(7)
UNCOMFORTABLE(11)	INCOMFORTABLE(9)	UNBEQUEM(10)	INCÓMODO(10)

(Table continued on next page)

Table 2 continued

DAY(2)	JOUR(2)	TAG(2)	DÍA(2)
NIGHT(2)	NUIT(2)	NACHT(2)	NOCHE(2)
DIRECT(3)	DIRECT(6)	DIREKT(3)	DIRECTO(4)
INDIRECT(12)	INDIRECT(12)	INDIREKT(8)	INDIRECTO(8)
DRY(3)	SEC(3)	TROCKEN(5)	SECO(3)
WET(4)	MOUILLÉ(5)	NASS(9)	MOJADO(6)
EARLY(2)	TÔT(3)	FRÜH(2)	TEMPRANO(4)
LATE(2)	TARD(2)	SPÄT(2)	TARDE(2)
FAST(2)	VITE(2)	SCHNELL(2)	PRONTO(2)
SLOW(3)	LENT(4)	LANGSAM(3)	LENTO(4)
FIND(2)	TROUVER(2)	FINDEN(2)	ENCONTRAR(2)
LOSE(3)	PERDRE(2)	VERLIEREN(2)	PERDER(2)
FRIEND(2)	AMI(2)	FREUND(2)	AMIGO(2)
ENEMY(3)	ENNEMI(2)	FEIND(2)	ENEMIGO(2)
FULL(2)	PLEIN(2)	VOLL(2)	LLENO(2)
EMPTY(4)	VIDE(4)	LEER(4)	VACIO(4)
GOOD(2)	BON(2)	GUT(2)	BUEN(2)
BAD(2)	MAUVAIS(2)	SCHLECHT(3)	MAL(2)

(Table continued on next page)

Table 2 continued

HIGH(2)	HAUT(2)	HOCH(2)	ALTO(2)
LOW(2)	BAS(2)	NIEDRIG(4)	BAJO(2)
HOT(2)	CHAUD(3)	HEISS(5)	CALIENTE(5)
COLD(2)	FROID(3)	KALT(3)	FRÍO(2)
HUSBAND(3)	MARI(3)	MANN(2)	ESPOSO(2)
WIFE(3)	FEMME(2)	FRAU(2)	ESPOSA(2)
IMPORT(7)	IMPORTATION(11)	EINFUHR(11)	IMPORTACIÓN(?)
EXPORT(11)	EXPORTATION(10)	AUSFUHR(12)	EXPORTACIÓN(13)
INCREASE(3)	AUGMENTATION(10)	VERMEHRUNG(6)	AUMENTO(5)
DECREASE(8)	REDUCTION(11)	VERMINDERUNG(11)	DIMINUCIÓN(?)
INDEPENDENT(6)	INDÉPENDENT(7)	SELBSTSTÄNDIG(4)	INDEPENDIENTE(5)
DEPENDENT(14)	DÉPENDENT(?)	ABHÄNGIG(6)	DEPENDIENTE(9)
LIFE(2)	VIE(2)	LEBEN(2)	VIDA(2)
DEATH(2)	MORT(2)	TOD(2)	MUERTE(2)
LIGHT(2)	CLAIR(3)	HELL(4)	CLARO(2)
DARK(2)	SOMBRE(3)	DUNKEL(3)	OBSCURO(2)
LIVE(2)	VIVRE(2)	LEBEN(2)	VIVIR(2)
DIE(2)	MOURIR(2)	STERBEN(2)	MORIR(2)
LONG(2)	LONG(2)	LANG(2)	LARGO(2)
SHORT(2)	COURT(3)	KURZ(2)	CORTO(3)

(Table continued on next page)

Table 2 continued

LOVE(2)	AIMER(2)	LIEBEN(2)	AMAR(2)
HATE(4)	HAÏR(6)	HASSEN(6)	ODIAR(7)
MORE(2)	PLUS(2)	MEHR(2)	MÁS(2)
LESS(2)	MOIN(2)	WENIGER(2)	MENOS(2)
NEAR(2)	PRÈS(3)	NAH(2)	CERCA(2)
FAR(2)	LOIN(2)	FERN(2)	LEJOS(2)
PEACE(3)	PAIX(3)	FRIEDE(3)	PAZ(2)
WAR(2)	GUERRE(3)	KRIEG(2)	GUERRA(2)
POSITIVE(9)	POSITIF(6)	POSITIV(8)	POSITIVO(7)
NEGATIVE(11)	NEGATIF(11)	NEGATIV(?)	NEGATIVO(7)
POSSIBLE(3)	POSSIBLE(2)	MÖGLICH(2)	POSSIBLE(2)
IMPOSSIBLE(5)	IMPOSSIBLE(3)	UNMÖGLICH(3)	IMPOSSIBLE(2)
PRESENCE(4)	PRESENCE(2)	ANWESENHEIT(9)	PRESENCIA(3)
ABSENCE(7)	ABSENCE(5)	ABWESENHEIT(9)	AUSENCIA(4)
REWARD(6)	RÉCOMPENSE(6)	ANERKENNUNG(5)	PREMIO(4)
PUNISHMENT(6)	PUNITION(12)	STRAFE(4)	CASTIGO(4)
RIGHT(2)	JUSTE(2)	RICHTIG(2)	JUSTO(3)
WRONG(3)	FAUX(3)	FALSCH(3)	MAL(2)
STRONG(2)	FORT(2)	STARK(2)	FUERTE(2)
WEAK(3)	FAIBLE(3)	SCHWACH(3)	DEBIL(4)

(Table continued on next page)

Table 2 continued

SWEET(2)	DOUX(2)	SÜSS(4)	DULCE(2)
SOUR(9)	AMER(4)	SAUER(9)	AMARGO(4)
TOGETHER(2)	ENSEMBLE(2)	ZUSAMMEN(2)	JUNTO(2)
APART(4)	SÉPARÉ(2)	GETRENNT(3)	SEPARADO(3)
VICTORY(5)	VICTOIRE(4)	SIEG(4)	VICTORIA(5)
DEFEAT(7)	DEFAITE(8)	NIEDERLAGE(8)	DERROTA(9)
WEALTH(4)	RICHESSE(5)	VERMÖGEN(4)	RIQUEZA(3)
POVERTY(7)	PAUVRETÉ(12)	ARMUT(10)	POBREZA(5)
WHITE(2)	BLANC(2)	WEISS(2)	BLANCO(2)
BLACK(2)	NOIR(2)	SCHWARTZ(3)	NEGRO(2)
WIDE(2)	LARGE(2)	BREIT(4)	ANCHO(3)
NARROW(3)	ÉTROIT(3)	SCHMAL(6)	ANGOSTO(8)

(*) The figures in brackets indicate frequency ranks: (1) means that the word is among the 500 most frequent words, (2) that it is among the 1000 most frequent words, (3) that it is among the 1500 most frequent words, etc. The source of these counts is Eaton (1940).

Table 3

Free Response Emission as a Function of Word-frequency and Word Value (from Siegel, 1960)

Word value	Word frequency			
	Low	Medium	High	$\bar{X}$
Good	7.43	9.43	9.68	8.85
Medium	6.28	8.57	8.71	7.85
Bad	6.28	5.86	7.71	6.61
$\bar{X}$	6.66	7.95	8.70	--

Table 4

Polar Opposites of the Semantic Differential and Their Frequencies

	Evaluative Factor		
BEAUTIFUL	UGLY	987	178
CLEAN	DIRTY	781	221
FAIR	UNFAIR	561	59
FRAGRANT	FOUL	66	39
GOOD	BAD	5122	1001
GRATEFUL	UNGRATEFUL	194	13
HAPPY	SAD	1449	202
HARMONIOUS	DISSONANT	26	9
HONEST	DISHONEST	393	41
KIND	CRUEL	1521	165
NICE	AWFUL	630	370
PLEASANT	UNPLEASANT	457	114
POSITIVE	NEGATIVE	92	28
REPUTABLE	DISREPUTABLE	23	21
SACRED	PROFANE	102	13
SUCCESSFUL	UNSUCCESSFUL	352	14
SWEET	SOUR	679	102
TRUE	FALSE	1711	209
WISE	FOOLISH	420	223

(continued on next page)

Table 4

Polar Opposites of the Semantic Differential and Their Frequencies

Potency Factor

BASS	TREBLE	28	17
BRAVE	COWARDLY	216	26
DEEP	SHALLOW	881	104
HARD	SOFT	1909	549
HEAVY	LIGHT	680	1005
LARGE	SMALL	1697	1818
MASCULINE	FEMININE	54	40
MATURE	YOUTHFUL	91	99
ROUGH	SMOOTH	294	346
RUGGED	DELICATE	37	248
SEVERE	LENIENT	119	9
STRONG	WEAK	770	276
TENACIOUS	YIELDING	22	7
THICK	THIN	443	646
WIDE	NARROW	593	391

(Table 4 continued)

Table 4

Polar Opposites of the Semantic Differential and Their Frequencies

Activity Factor

ACTIVE	PASSIVE	514	434
BRIGHT	DARK	645	1005
EXCITABLE	CALM	7	267
FAST	SLOW	514	434
HERETICAL	ORTHODOX	2	21
HOT	COLD	1006	1092
RASH	CAUTIOUS	37	48
SHARP	DULL	324	289

Table 5

Preference Ranks and Frequency Counts for Ten Countries and Ten Cities

COUNTRIES			CITIES		
Country	Frequency	Average Preference Rank	City	Frequency	Average Preference Rank
ENGLAND	497	2.67	BOSTON	255	2.75
CANADA	130	3.33	CHICAGO	621	3.08
HOLLAND	59	3.42	MILWAUKEE	124	3.83
GREECE	31	4.00	SAN DIEGO	9	4.25
GERMANY	224	4.92	DAYTON	14	5.75
ARGENTINA	15	6.08	BALTIMORE	68	6.08
VENEZUELA	9	6.58	OMAHA	28	7.08
BULGARIA	3	7.75	TAMPA	5	7.08
HONDURAS	1	7.92	EL PASO	1	7.50
SYRIA	4	8.34	SAGINAW	2	7.58

Table 6

Preference ratings of trees, fruits, vegetables and flowers, and their corresponding frequencies

Trees	f*	A.P.R.**	Fruits	f	A.P.R.	Vegetables	f	A.P.R.	Flowers	f	A.P.R.
PINE	172	4.79	APPLE	220	5.13	CORN	227	4.17	ROSE	801	5.55
WALNUT	75	4.42	CHERRY	167	5.00	POTATO	384	4.13	LILY	164	4.79
OAK	125	4.00	STRAWBERRY	121	4.83	LETTUCE	142	4.00	VIOLET	109	4.58
ROSEWOOD	8	3.96	PEAR	62	4.38	CARROT	96	3.57	GERANIUM	27	3.83
BIRCH	34	3.83	GRAPEFRUIT	33	4.00	RADISH	43	3.13	DAISY	62	3.79
FIR	14	3.75	CANTALOUPE	1.5	3.75	ASPARAGUS	5	2.33	HYACINTH	16	3.08
SASSAFRAS	2	3.00	AVOCADO	16	2.71	CAULIFLOWER	27	1.96	YUCCA	1	2.88
ALOES	1	2.92	POMEGRANATE	8	2.63	BROCCOLI	18	1.96	WOODBINE	4	2.87
YEW	3	2.83	GOOSEBERRY	5	2.63	LEEK	3	1.96	ANEMONE	8	2.54
ACACIA	4	2.75	MANGO	2	2.38	PARSNIP	8	1.92	COWSLIP	2	2.54

(*) Frequency of usage (L-Count). (**) Average preference rating.

Figure Captions

Fig. 1. Average frequencies of 555 adjectives rated for favorability (Based on data from Anderson, 1964).

Fig. 2 Average rated affective connotation of nonsense words and Chinese characters as a function of frequency of exposure.

Fig. 3. Average rated affective connotation of nonsense words exposed with low and high frequencies.

Fig. 4. Average rated affective connotation of Chinese characters exposed with low and high frequencies.

Fig. 5. Average attitude toward photographs as a function of frequency of exposure.

Fig. 6. Average attitude toward photographs exposed with low and high frequencies.

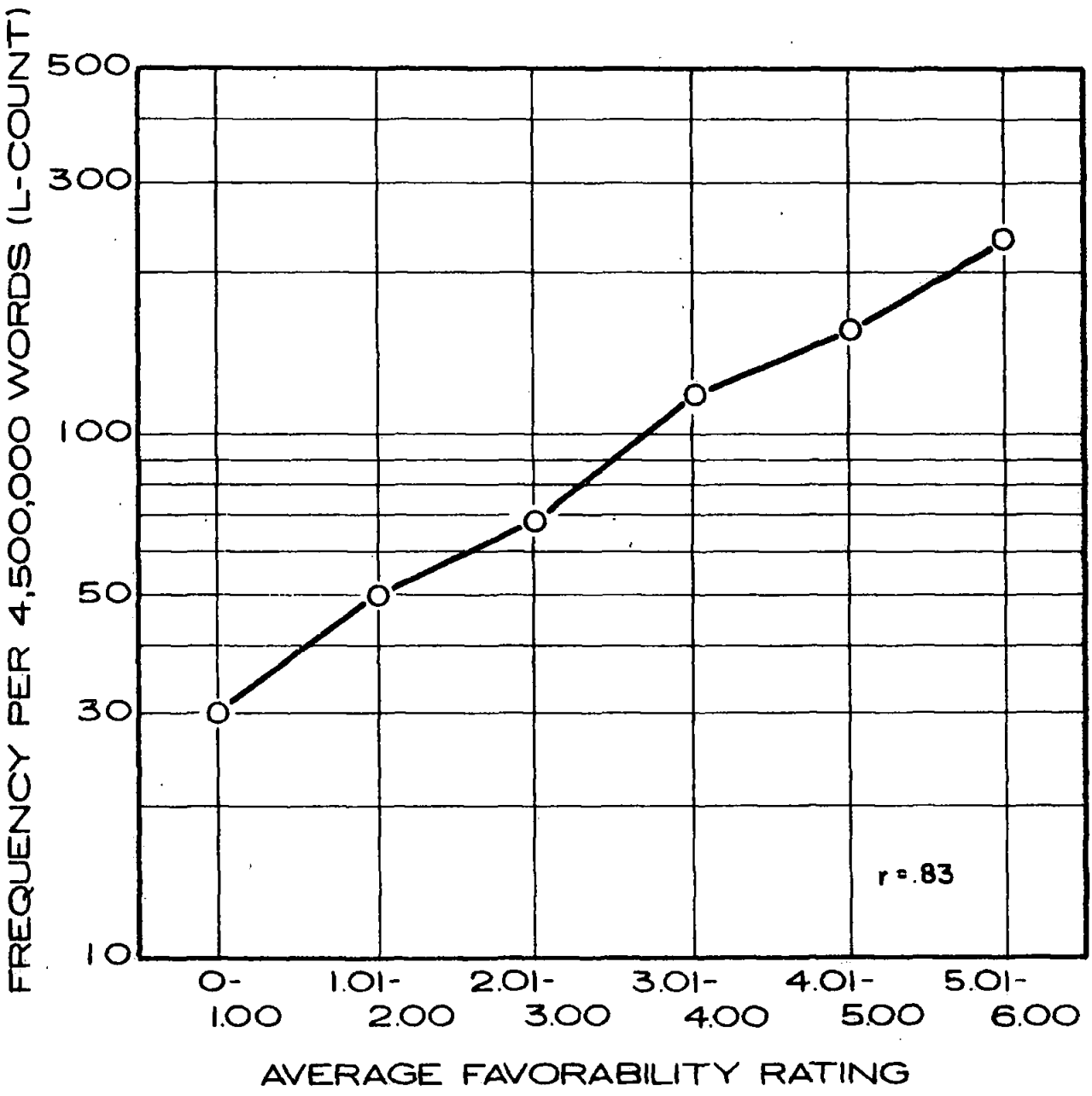

FIG. 1. Average frequencies of 555 adjectives rated for favorability (based on data from Anderson, 1964).

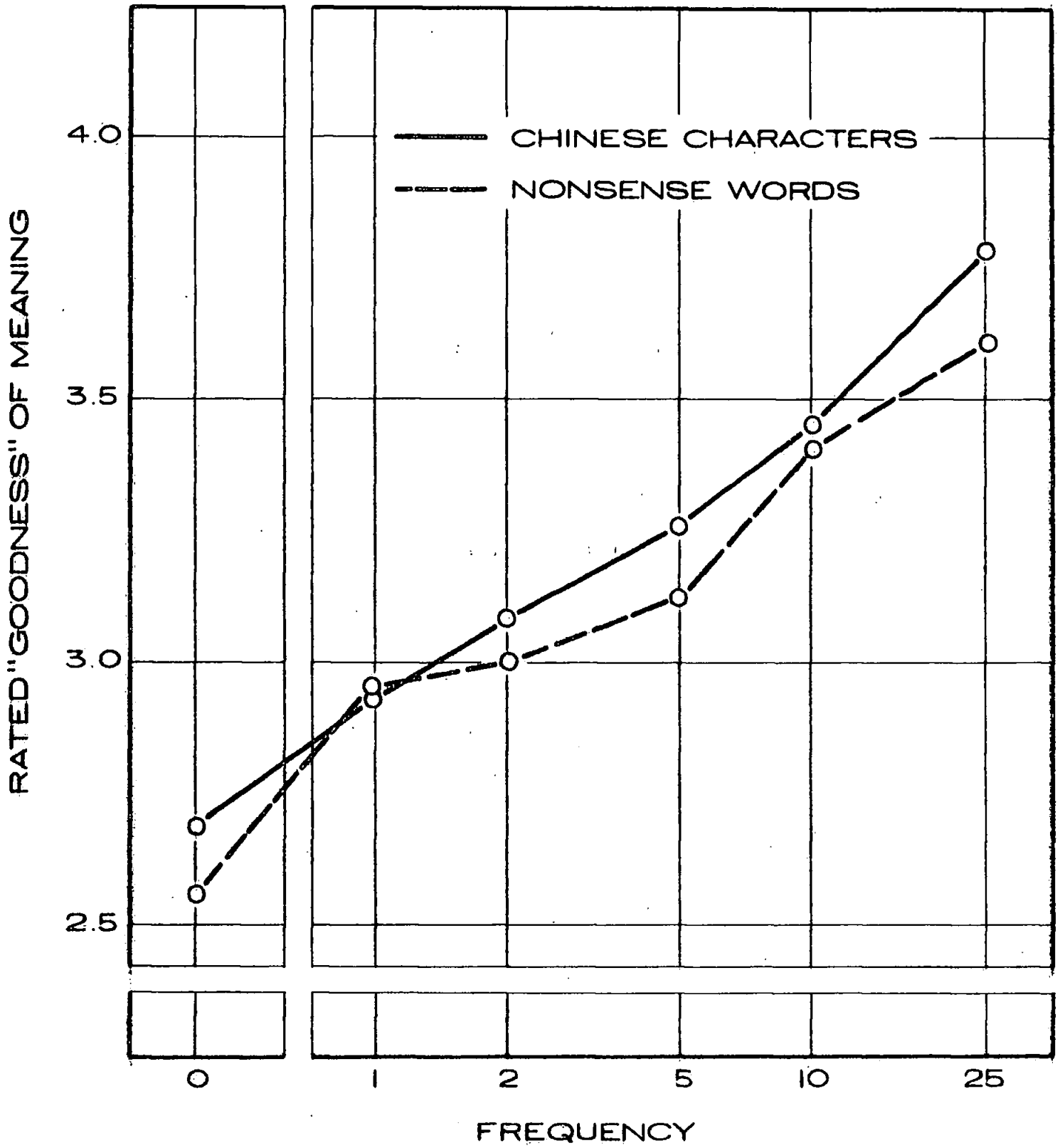

FIG. 2. Average rated affective connotation of nonsense words and Chinese characters as a function of frequency of exposure.

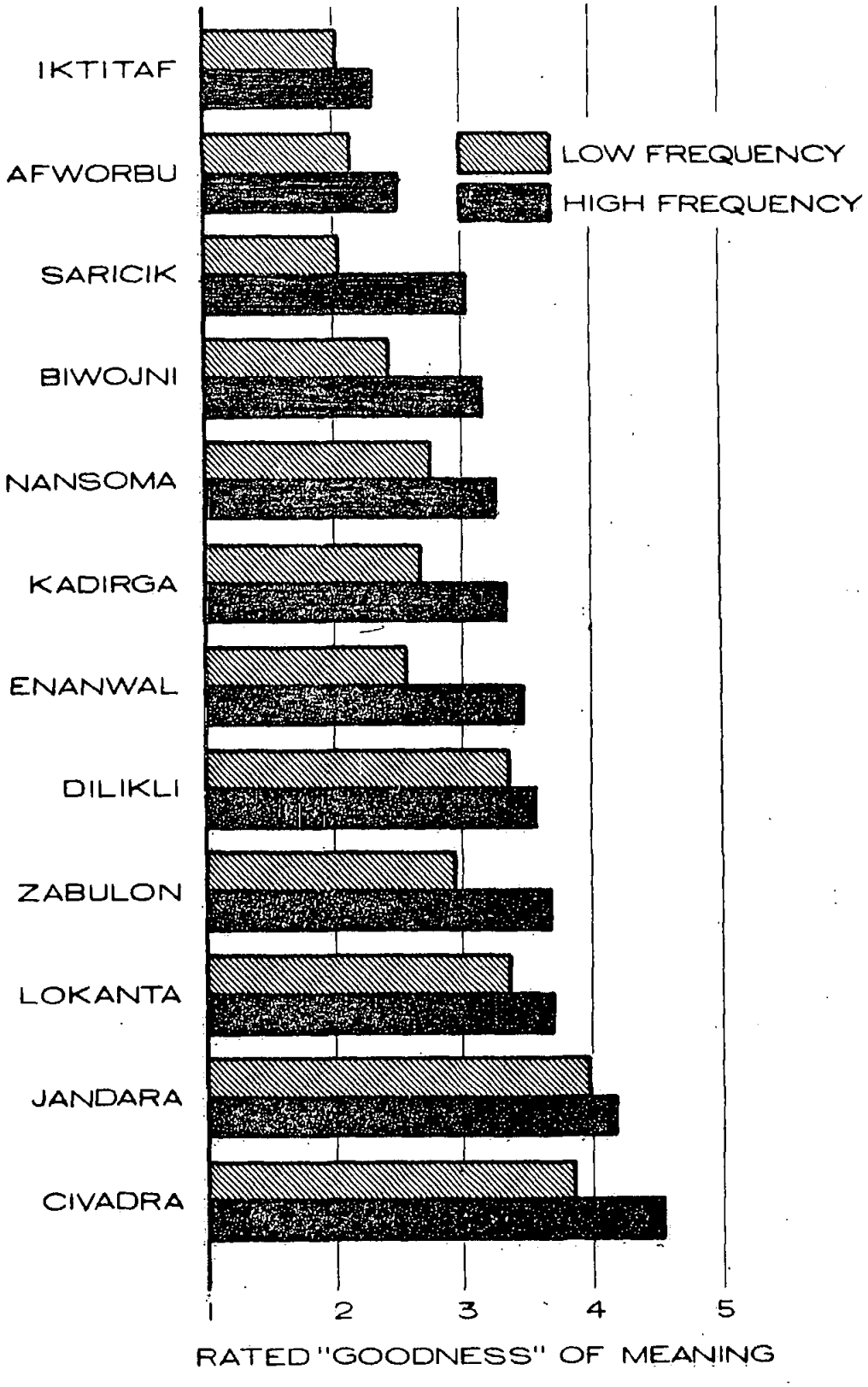

FIG. 3. Average rated affective connotation of nonsense words exposed with low and high frequencies.

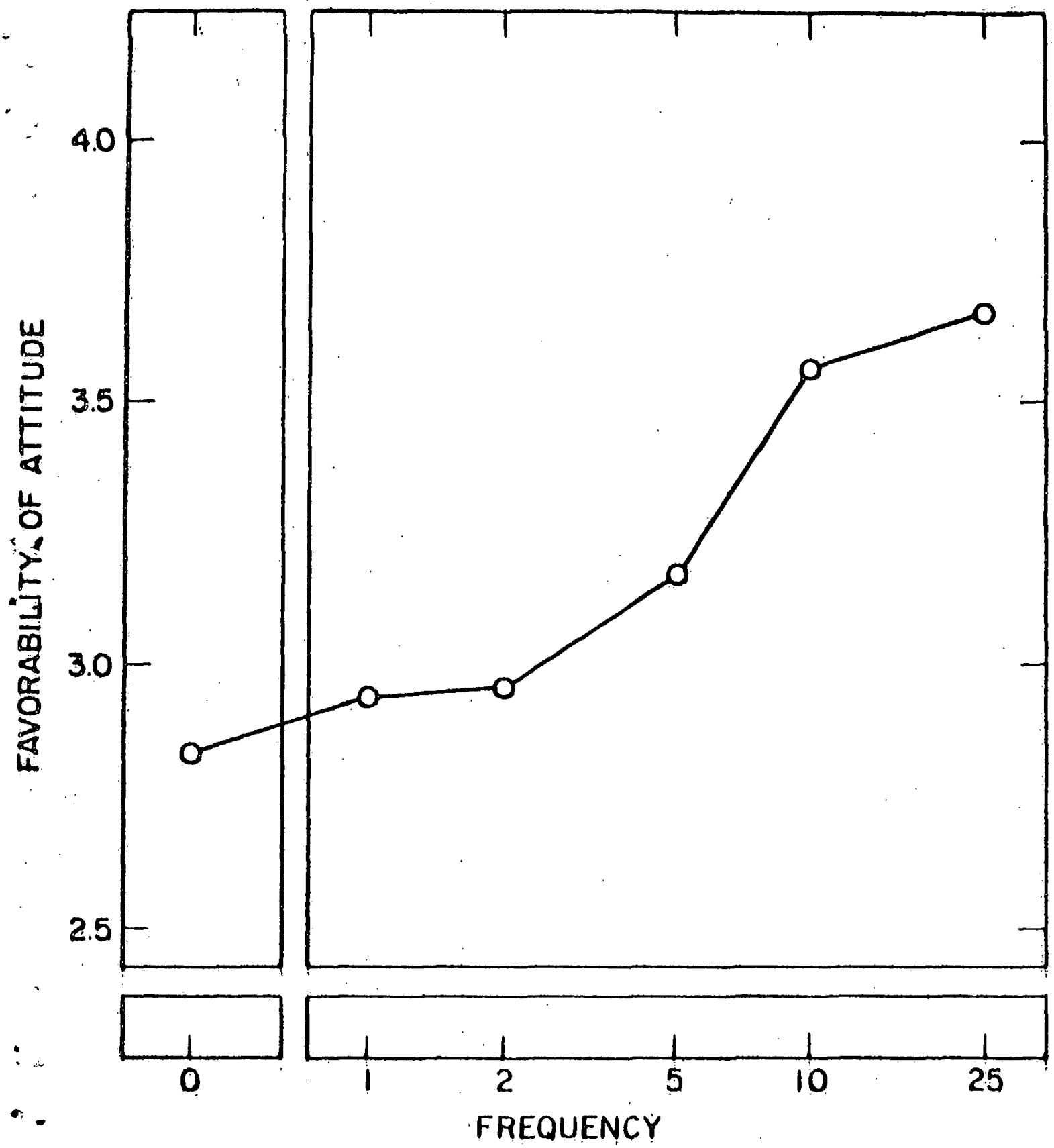

FIG. 6. Average attitude toward photographs as a function of frequency of exposure.

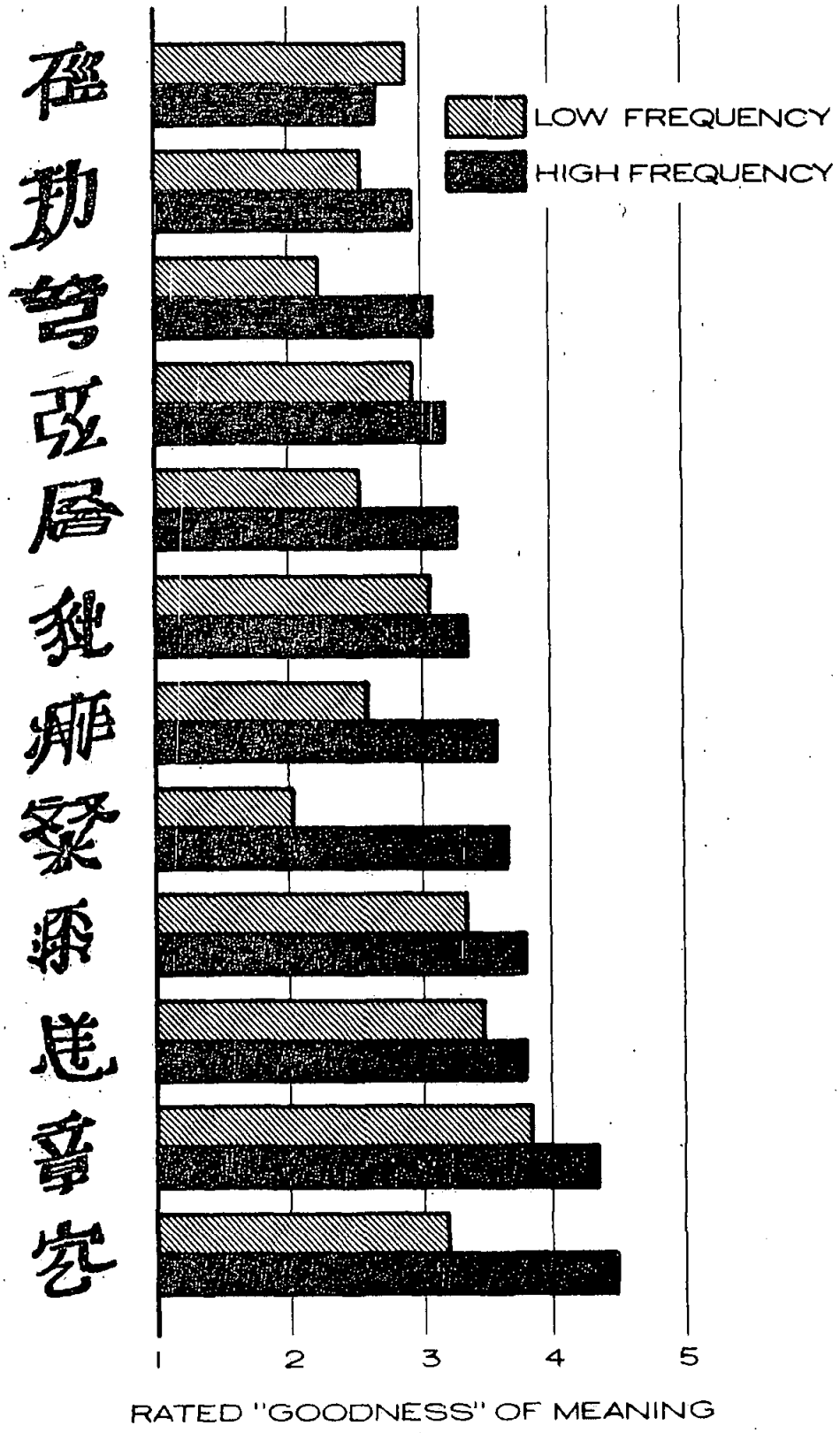

FIG. 4. Average rated affective connotation of Chinese characters exposed with low and high frequencies.

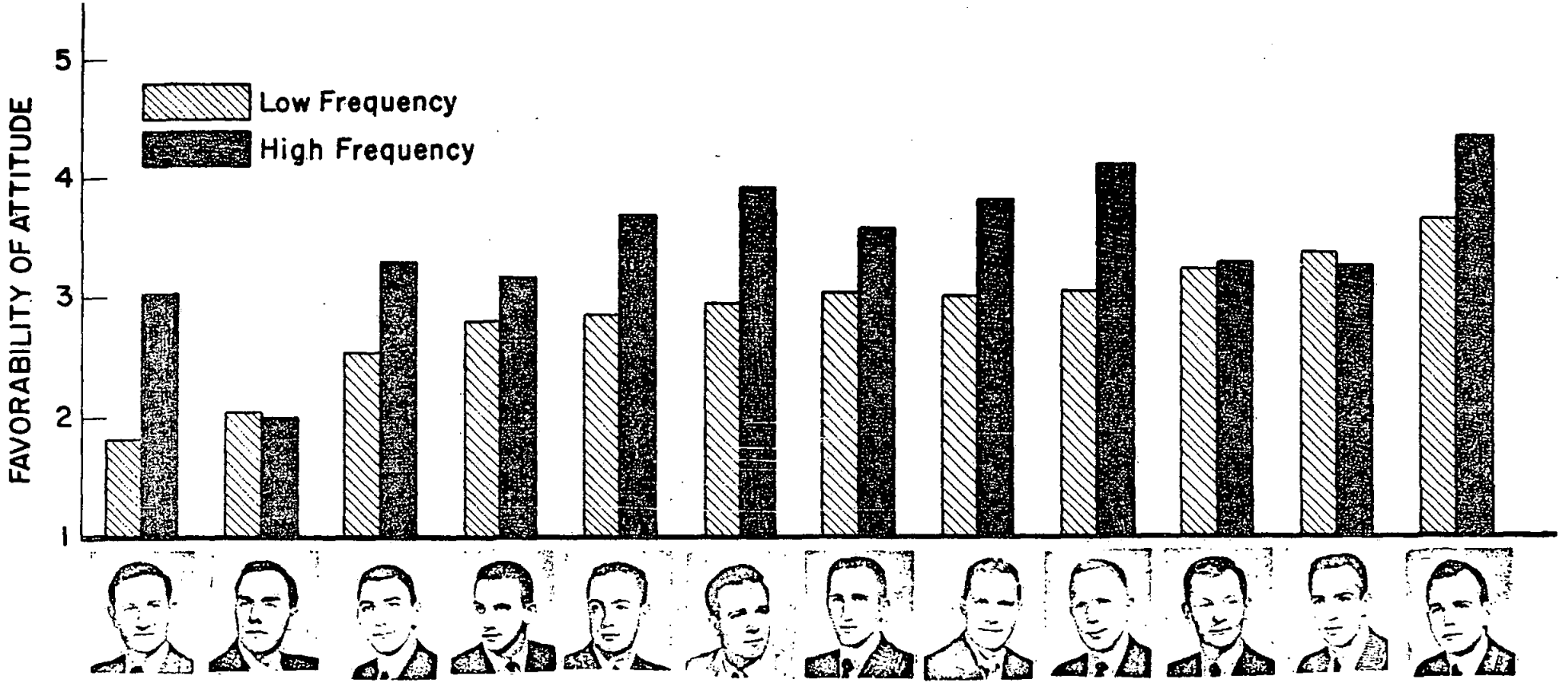

FIG. 6. Average attitude toward photographs of men exposed with low and high frequencies.