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THE EFFECT OF EMOTIONAL MEANING ON
WORD PERCEPTION

by

Frances Herb

A Thesis Submitted to the Faculty of the Graduate School
of Loyola University in Partial Fulfillment of
the Requirements for the Degree of
Master of Arts

June

1962

LIFE

Frances Herb was born in Columbia, California, on September 3, 1912, the daughter of William and Helen Wax.

She was graduated from El Dorado County High School, Placerville, California, in June, 1930, and from the University of California at Berkeley, California, May, 1934, with the degree of Bachelor of Arts.

After serving as a member of the Women's Army Corp during World War II, the author joined the Chicago Police Department as a Policewoman in December, 1946. She began her graduate studies at Loyola University in February, 1958.

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CHAPTER I

THE PROBLEM

The investigation of various factors affecting perception has occupied experimenters since psychology became a separate discipline. Physical aspects of the stimulus and physiological aspects of the subject have been found to influence perception. Recently experiments have been designed to test whether certain subjective aspects of the stimulus might also affect its perception. Can the emotional impact of the meaning of a word affect the speed and accuracy with which that word can be perceived? In a chapter on "Central Dynamics in Perception" Charles E. Osgood stated, "Not only do interactions of varying complexity within the visual system operate to determine what we perceive, but it can be shown that events quite outside this sensory system also contribute. Thus the deliberate manipulation of motives, attitudes, values, and meanings may measurably alter the perceived character of objects in the visual field."¹ How significant are these measured alterations? A vigorous controversy has been raging in psychological publications regarding the extent and the

¹Charles E. Osgood, Method and Theory in Experimental Psychology (New York, 1953), pp. 285-286.

interpretation of the measurements of such alterations.

An experiment that helped to set off the controversy was reported by McGinnies² as testing the relationship between "threat" sign-values and ease of perception. He conjectured that autonomic reactions would be aroused before conscious awareness and that this emotional state would raise the perceptual threshold. He presented his subjects eleven neutral words and seven critical, emotionally charged words. He determined recognition thresholds with a tachistoscope, and measured the emotional disturbance from galvanic skin responses. He found that the "taboo" words required longer exposures for recognition and that their pre-recognition presentations were accompanied by decidedly stronger emotional reactions. McGinnies interpreted his results as being evidence of "perceptual defense", an unconscious mechanism of resistance to recognition of threatening stimuli.

McGinnies' interpretation was immediately challenged by Howes and Solomon³, who asserted that the differences found in the recognition-thresholds were in part due to familiarity, or frequency-in-use, differences, and in part due to the reluctance of subjects to report obscene words.

²E. McGinnies, Emotionality and perceptual defense. Psychol. Rev., 1949, 56, 244-51.

³D. H. Howes and R. L. Solomon, A Note on McGinnies' 'Emotionality and perceptual defense'. Psychol. Rev., 1950, 57, 229-34.

Kenneth R. Newton⁴ attempted to reduce suppression of the reporting of stimuli to a minimum in a study on the effect of pleasantness versus unpleasantness by having the subjects record their responses to tachistoscopically flashed words in a test booklet rather than having them make a verbal report. He used two sets of seven words, each having five letters and being matched for word count frequency. As pleasant words he used: adore, peace, mirth, jolly, charm, laugh, and honey; and as unpleasant words he used: agony, beast, slain, cheat, shame, death, and cruel. He scored the words reported incorrectly and found more errors were made to unpleasant words than to the pleasant ones. He concluded that factors of familiarity and suppression of reporting would not account for all the differences found in studies on perception of emotionally charged stimuli.

In another experiment Kenneth Newton continued his study of perception thresholds related to the pleasantness or unpleasantness of stimuli. He used lists of ten words (such as angle, ankle, and ample) differing by one letter, two letters, or by three and more letters to control differences in the relative legibility of the different letters comprising the words. In this experiment he did not depend on the meaning naturally attached to the words, but used a learning technique accompanied by reward and punishment to establish equal familiarity with the words and to charge

⁴Kenneth R. Newton, A note on visual recognition thresholds. J. Abnorm. soc. Psychol., 1955, 51 709-10.

them affectively. He concluded, "Those 'actions leading to pleasure' seem to have resulted in lower recognition...while those 'actions leading to pain' resulted in higher recognition thresholds."⁵

Although Leo Postman had collaborated with Bruner and McGinnies in investigating behavioral determinants of perception and in offering the theory of "perceptual defense" to explain the results obtained,⁶ he later worked with Solomon and concluded that frequency of prior usage could alone account for all the results found.⁷ They used ten, seven-letter, nonsense words exposed from one to twenty-five times prior to the test, ten English words of equal length, and ten nonsense words not previously exposed. They determined the tachistoscopic recognition thresholds for the three sets of words and found that the number of previous exposures of the nonsense words bore a direct relation to the recognition thresholds thus determined.

M. Wiener⁸ also questioned whether there was actually the

⁵Kenneth R. Newton, Visual recognition thresholds and learning. Percept. mot. Skills, 1956, 6, 81-87.

⁶Leo Postman, J. S. Bruner, and E. McGinnies, Personal values as selective factors in perception. J. Abnorm. soc. Psychol., 1948, 43, 142-155.

⁷R. L. Solomon, and L. Postman, "frequency of usage as a determinant of recognition thresholds for words. J. exp. Psychol., 1952, 43, 195-201.

⁸M. Wiener, Word frequency or motivation in perceptual defense. J. Abnorm. soc. Psychol., 1955, 51, 214-218.

phenomenon of differential perception depending on "meaning" or whether the mere structure of the letters might be an important factor in determining perception thresholds. He designed an experiment to control structural determinants and frequency by using words with two meanings in different context. He used four critical words: fairy, pussy, balls, and screw; neutral words such as: play, child, fable, story, angel, godmother, goblin, fantasy, and read; and such threat words as: male, odd, rear, queer, homosexual, fruit, hold, and masturbate. He found significant differences in results from one group reading the words in the neutral context and the other group reading them embedded in the threat context, and concluded that word frequency and structure alone could not account for the differences.

James Freeman, "To determine the influence of a set created by instructions upon the perceptual-defense phenomenon"⁹, used eighty-eight naive Psychology 1A male subjects in four groups. One group was instructed, "Respond with what you see," the second group was instructed, "The material includes some taboo words, respond as soon as possible," the third group was told to look for "fruit" words. These three groups were given the same list of six words (four neutral and two obscene) exposed through a Gerbrands Mirror Tachistoscope. The fourth group, used as a control, was given the same four neutral words and two innocent words,

⁹James T. Freeman, Set or perceptual defense? J. Exp. Psychol., 1954, 48, 283-288.

hiss and muck. Freeman found that when the subjects were set to expect taboo words the results did not differ from those of the control group. Freeman concluded that the results eliminated any evidence of perceptual defense.

In 1958 Isreal Goldiamond¹⁰ published a prodigious study of the literature, not only concerning threshold perception, but also concerning the allied and the implied problems of subliminal perception, subception (which he defined as "discrimination without awareness"), and unconscious perception. He listed 198 references and grouped, classified, analyzed, and criticized them in regard to methods, controls, indicators, and theoretical explanantions of results. He said, "The major point of this paper will be that much of the controversy in the area of unconscious perception is peripheral to the central problem of psychophysical procedures utilized."¹¹ He continued, "There is considerable evidence to suggest that the 'below threshold' of subliminal perception is considerably above threshold. Like the merchant who artificially raises 'wholesale' prices to sell 'below cost' at a high profit. So 'there is less here than meets the eye'.¹² Goldiamond concluded, "The psychophysical complexities of the stimulus material

¹⁰ Isreal Goldiamond, Indicators of Perception: I. Subliminal perception, subception, unconscious perception: An analysis in terms of psychophysical indicator methodology. Psychol. Bull. 1958, 55, 6, 373-411.

¹¹ Ibid., p. 373.

¹² Ibid., p. 386.

utilized, and differences in procedures involved make it difficult to compare experiments in terms of differential thresholds, or to obtain norms."¹³

Nevertheless, experimentation continued and Walters, Banks, and Ryder reported that they found results to confirm their hypothesis: "Other conditions being equal, nontaboo words that immediately follow subliminally presented taboo words will be correctly identified less often than nontaboo words that follow subliminally presented nontaboo words."¹⁴

The solution of these questions is important not only to psychology, but to all other fields concerned with human behavior. For instance, in our courts of law the rules of evidence state that the first-hand account of an eye-witness is the best evidence. Verdicts involving judgments of millions of dollars and sentences of long prison terms, or even of death, have hinged on the testimony of eye-witnesses. But how reliable is the testimony of such a witness? What are the factors that affect perception? Members of the legal profession have long been alert to, and have taken into account, the effects of physical inability, conditions of health or age, and of consciously biased interests. Psychology has called attention to the distortions of perception that might result because of the field surrounding the object being perceived,

¹³Ibid., p. 387.

¹⁴Richard Walters, K. Banks, and Robert R. Ryder, A test of the perceptual defense hypothesis. J. Pers., 1959, 27, 47-55.

as for example, in the well-known Müller-Lyer Illusion, and clever lawyers have discredited witnesses by the use of such figures. How much influence on perception must one attribute to the "meaning" that a stimulus signifies to a perceiver?

Without taking exception to Goldiamond's conclusion that comparison between experiments is difficult, this writer believes that only with more and expanded work will the true facts eventually emerge so clearly that undisputable statements can be made regarding the effect of emotional meaning upon the perception of stimuli. The question of how any central dynamic mechanism could operate prior to perception to influence that perception must wait until enough experiments have been carefully done to establish that threshold differentials are not due to incidental factors such as familiarity, set or expectation, or ambiguity of material.

The purpose of this paper is to add more evidence for consideration that the emotional meaning of a word has a real effect on the difficulty of visibly discerning that word, and that this effect is greater than the combined effect of familiarity and legibility.

The null hypothesis proposed for testing was: The mean number of exposures necessary for correct recognition of emotionally charged words will not be significantly greater than the number necessary for the correct recognition of non-emotional words. Two correlated hypotheses were also proposed: (1) Familiarity of the word will have a correlation near zero with the difficulty of

reading the word, and (2) the legibility according to the conformation of the individual letters will have a positive, but not significant, correlation with such difficulty. The writer also proposed a fourth hypothesis, to wit: Individual differences among subjects in the degree of emotional involvement will be reflected in a greater variance of responses to emotional words than to neutral ones.

CHAPTER II

THE PROCEDURE

One hundred words were selected from 270 words¹ of similar composition of letters found in Webster's unabridged Dictionary, and were used as stimuli in this experiment. Each word contained six letters and ended in le. Words of this particular pattern were chosen because the large supply of such words in the English language allowed the maximum similarity of letters between the various words to lessen the effect of guessing from minimal cues. Twenty additional words were used for practice.

An IBM electric typewriter (to assure uniform print) was used to type each word in capital letters on a separate, plain, white card. Each word was presented in a personal tachistoscope, the "Tachitron, model So-5", until it was correctly identified by the subject. This instrument was equipped with an electric bulb that lit when a lever was pressed. One setting of a control dial allowed the light to remain on and the printing on a card inserted behind the light to remain visible. Four other settings progressively shortened the time the light remained on and so progressive-

¹For the list of these 270 words see Appendix III, p. 38

ly shortened the exposure of the stimulus material. After the cards were arranged in random order they were placed in the tachistoscope in packs of twenty-five. The order was reversed for half the subjects.

Eight male and twenty-two female students from a Psychology 1A class participated as subjects. They were tested individually in a session which took approximately one hour for each subject. They were informed that the experiment involved a problem regarding the factors influencing perception, but were not told that the meaning of the word was one of the factors being considered. They were assured that there were no hidden tricks nor any cause for embarrassment in the experiment.

To familiarize the subjects with the technique a pre-test practice period was given on twenty words.² It was introduced with the following instructions:

This is an experiment to determine the visual perception threshold for a number of words. There are no "tricks" to this test. All of the words to be used are similar to, but different from, each other. They are all six-letter words, ending in le. They have been typed in capital letters on separate cards. Some of the words are very common and will be familiar to you, while others are quite rare and may be unknown to you. It is expected that some words will be more easily read than others because of the shape of their letters and because of their familiarity to you. The purpose of this experiment is to see what these effects are.

You will be shown the words one at a time on this tachistoscope. You will be given a pre-test training period to

²For the list of practice words see Appendix IV, p. 43.

familiarize you with the technique. Sit comfortably in front of the box and look straight into it. When I press this lever, the light will flash on so you can see the word. I can vary the length of time the light will stay on by setting this dial. You are to report the word (or its letters) as soon as you are sure what it is. I will keep pressing until you report the word (or its letters) correctly. Do not merely guess, but report what you think you see. The number of flashes necessary will be the score that word receives.

For this experiment you will not be competing with yourself nor with anyone else. I am only interested in the scores the different words receive. I want to know if each word will receive about the same score from each person.

In order to get a good range of scores for the different words, I will adjust the length of exposure to your own eye sight so that several exposures will be necessary for you to read even the easiest word. During this pre-test period the first word will be shown with maximum clarity, or the longest time of exposure, then the time will be reduced until the best degree of difficulty for you has been reached. From then on, all the words will be shown at the same speed.

Are there any questions?

Because the tachistoscope that was used lacked an exposure setting fast enough to prevent most words being read on the first or second exposure, it was necessary to insert a sheet of ground glass in front of the words to increase the difficulty of perception for some subjects. After the speed was established for a subject during the pre-test period, that speed was used for the initial presentations of all words to that subject. However, if a subject failed to correctly identify a word after twenty presentations, in order to prevent excessive fatigue, the speed was slowed one setting and the presentation and counting was continued.

The experimenter allowed time between each presentation for a response and answered each response with, "Not quite," if in-

correct, or with, "That's right," if correct, and entered the number of presentations on a tally-sheet, then removed the card just viewed, placing it behind the other cards in the instrument.

The test was given immediately following the practice. It was introduced with the instructions:

All right, now you know what to do. I think this setting will be difficult enough for you so you won't get them all the first time. Remember, I am not interested in how well you do, but in the relative difficulty of the different words. There will be 100 words in this test. All are different from, but similar to, the words you have just seen. Are you ready?

After all the subjects had been tested the list of test words was submitted to a panel of ten graduate psychology students for rating for affective tone. They were given a scoring sheet with the heading, "Emotional Rating Sheet," and the instructions, "Please go through the following list and mark with an O all the words with which you are not familiar, then mark with an E the fifteen (15) words you think carry the greatest affective tone." All words receiving even one vote were later treated as "emotional" words. Of the 100 words, 46 were designated emotional and 54 were called non-emotional, or control, words. The complete list of these words is given in the Appendix.³

The test words were grouped into ten classes for familiarity according to the Thorndike-Longe list of word frequencies.⁴ The

³ See Appendix I, p. 32.

⁴ Edward Thorndike and Irving Longe. The Teacher's Book of 30,000 Words (New York, 1944).

frequency of the count, the distribution of the total words used, and the number of emotional and control words in each class are shown in Table I on page 15.

The 100 words were also grouped in ten classes for legibility according to Roethlein's average rank order for the legibility of upper-case letters, given as "WMLJI ATCVQ PDOYU FHIGN ZKERBS."⁵ Each letter was assigned a value equivalent to its rank position, for instance, 1 for "W" and 26 for "S". The values of the letters composing the words were summed, giving 22 for little and 90 for bubble. Table II on page 16 gives the limits of the classes and the frequencies of the words in each class. The larger values mean the more difficult the word would be to read because of the conformation of the component letters.

⁵ B. Roethlein, The relative legibility of different faces of printing types. Amer. J. Psychol., 1912, 23, cited in S. S. Steven's Handbook of Experimental Psychology (New York, 1958).

TABLE I
FREQUENCY OF WORD IN CLASSES OF FAMILIARITY

Class	Thorndike-Longe count	Total frequency	Frequency	
			Emotional	Control
1	100 or over per million	8	5	3
2	At least 50 per million	4	3	1
3	25 to 49 per million	3	2	1
4	10 to 24 per million	10	8	2
5	3 to 9 per million	16	13	3
6	2 per million	12	5	7
7	1 per million	13	6	7
8	5 to 17 per 18 million	8	3	5
9	At least 4 per 18 million	2	0	2
10	Not appearing	<u>24</u>	<u>1</u>	<u>23</u>
		100	46	54

TABLE II
FREQUENCIES OF LEGIBILITY VALUES

Class	Legibility values	Total frequency	Frequency	
			Emotional	Control
1	21 - 27	7	4	3
2	28 - 34	6	3	3
3	35 - 42	13	4	9
4	43 - 49	18	12	6
5	50 - 56	15	7	8
6	57 - 63	15	6	9
7	64 - 70	10	3	7
8	71 - 77	9	5	4
9	78 - 84	5	1	4
10	85 - 91	2	1	1
		<u>100</u>	<u>46</u>	<u>54</u>

CHAPTER III

THE RESULTS

The score for each word was the sum of the number of presentations required by each of the thirty subjects to correctly identify the word. These scores ranged from 38 for little to 413 for buddle. The highest number of presentations to any one subject needed by any word was 81 for circle. Boodle, jirble, and creole were the only words that were not recognized on the first presentation by at least one subject. All subjects except one (and he correctly called 20 words on the second presentation) recognized one or more words on the first presentation. The average score for all words was 159.6, with a standard deviation of 92. The distribution was positively skewed.

The Pearson Coefficient of Correlation was computed from the half-scores on the two orders of presentation. Although an occasional extremely high number (for instance, that 81 that one subject needed to identify circle while an average of only 6 was needed by the other twenty-nine subjects) unbalanced the half-totals for some words, the coefficient of reliability was .81.

The scores for the 100 words were plotted against the classes of familiarity to show whether there was any correlation between

low scores and great familiarity and high scores and unfamiliarity. A positive coefficient of .24 was found. The same scores were also plotted against the classes of legibility to show if good legibility would correspond with low scores and difficult legibility with high scores. This coefficient was found to be a positive .28.

Although these coefficients were small, they were not zero, so an adjustment procedure was followed to eliminate the effects of the differences in familiarity and legibility among the words. The total scores for the various words were tabulated in the ten classes according to the relative degree of familiarity as previously determined by the Thorndike-Longe word-count.¹ These scores were then summed and averaged for each class; the deviation of these class averages from the over-all mean of all the words was computed. These figures had the effect of making the means for each class equal, regardless of familiarity. This adjustment figure for familiarity was then applied to each score and the resultant score was then tabulated in the ten classes according to the relative legibility of the corresponding word.² These scores were like-wise summed and averaged, and the class average was subtracted from the over-all mean. When added to the appropriate scores already adjusted for familiarity, this figure gave each

¹See Column 5, Table VI, in Appendix II, p. 34.

²See column 6, Table VI, in Appendix II, p. 34.

word a final score corrected for both familiarity and legibility. Table III, below, gives the adjustment figures for each class and the number of words in each category.

TABLE III
FREQUENCIES AND FIGURES TO ADJUST CLASS MEANS

Familiarity			Legibility		
Class	f.	Adjustment figure	Class	f.	Adjustment figure
1	8	49.0	1	7	26.1
2	4	46.6	2	6	35.4
3	3	- 5.0	3	13	36.6
4	10	- 2.4	4	18	8.4
5	16	30.9	5	15	18.0
6	12	- 15.8	6	15	- 17.5
7	13	- 11.9	7	10	- 35.8
8	8	60.6	8	9	21.2
9	2	-115.6	9	5	- 83.0
10	24	- 36.9	10	2	-226.0
	<u>100</u>			<u>100</u>	

The final adjusted scores were then tallied for the 46 emotional words and for the 54 non-emotional words. The mean of the emotional words was 152.0, and the standard deviation was 43.84,

while the mean for the control, or non-emotional, words was 165.5, with a standard deviation of 86.69. The t test was then applied to the differences between these means to see if the null hypothesis of no real differences would be tenable. The value found for t was .957, which is less than the t value of 1.987 needed for significance at the .05 level of confidence, therefore the null hypothesis is tenable and the experimental hypothesis that the emotional meaning attached to a word would cause a real difference in the threshold of perception for that word was not sustained.

Because inspection of the individual numbers of presentations³ showed an occasionally high count, such as the 81 for circle referred to above, the median number of trials was computed for each word to show a possibly more representative figure for comparing the words than was obtained from the total scores.

These median scores were then subjected to the same procedure of correction for familiarity and legibility as had been used on the total scores. The t test for significance of the mean differences between the emotional and control groups of words showed the value of 1.30, still below the critical value of 1.987 needed to show a true difference.

The variances of the adjusted total scores were found to be 7516 for the non-emotional words and 1922 for the emotional ones. This is a ratio of approximately 4 to 1. The same ratio held for

³For these individual raw scores see Appendix II, pp. 34-37.

the variances of the median scores of 1.764 and .0435. Thus the results not only did not support the fourth proposed hypothesis of greater variance for the emotional words, but was in the opposite direction. A third analysis of the data was made to this point. The mean number of presentations for each word was subtracted from the highest number of presentations of that word. Because each distribution was skewed in the same direction, the deviations all had the same algebraic sign. These deviations were added and averaged to give the values of 24.5 for the control words and of 20.1 for the emotional words. The three greatest single deviations were for non-emotional words. So, any way the data were tested, the hypothesis was not sustained.

CHAPTER IV

DISCUSSION

The method of adjusting the setting on the tachistoscope for each subject deserves some words of justification. One might say that adding together the results obtained on different settings would be like adding apples and pears. This is true and does limit the final interpretations that can be placed on the results. However, since the setting was held constant (or varied consistently after each 20 presentations of any word) for all the words for each subject, each word might be said to have received sections of an apple from one subject and sections of pears from another, so comparison could legitimately be made between the total number of sections of fruit each word received. The results show that familiar words that were easy to read, for example, little, "earned" fewer sections of fruit than unfamiliar, difficult words, such as buddle, did.

The coefficient of reliability was reported as a positive .81, but too much importance can not be attached to this figure because the distribution of scores was skewed and 64 per cent of the cases fell in just four of the sixteen intervals used for computing the coefficient.

Because one of the experimental hypotheses stated that it was expected that the familiarity of the words would have a correlation near zero with the difficulty of reading the word, the emotional words were not matched with the control words for familiarity. The found correlation of .24 was in line with this expectation. Further inspection of the third column of Table III, on page 19, will show the lack of a consistent trend. While in general the more familiar words scored lower than the average, and the less familiar ones scored higher than the average, the words in the third class averaged 25 presentations more than the average, and those in the eighth class averaged 60.6 less than the average. A more consistent trend might have been found with a better measure of familiarity, which might have been found by giving each subject a timed, free-association test to determine his personal familiarity with each word, rather than by relying on the averages based on the Thorndike-Longe count.

In regard to the legibility, the experimental hypothesis had stated that the legibility according to the conformation of the individual letters would have a positive, but not significant correlation with the difficulty of perception. The found correlation of a positive .28 would seem to sustain this hypothesis. Examination of the deviations from the mean as shown in the sixth column in Table III, on page 19, reveals a trend, although not a consistent one, of low scores for words with letters easily read, and high scores for words with letters difficult to read. The

average of the words in the third class was lower than the average of those in either the first or the second class, and the average of the words in the eighth class was even lower than that of those in the fourth class. Does this mean that the assigning of the legibility values was faulty, or that legibility really has an inconsistent effect, or does it mean that the effect is so slight that it operates only in a general way and is not the deciding factor for any particular word? Only continued experimentation will answer this question. For instance, the legibility measure was assigned more authority than it perhaps deserved. Equal intervals of value were assigned the letters according to the rank order of the difficulty with which they might be perceived without reference to the original data which might have shown some letters bunched in difficulty, and thus have given fractional steps for truer code values. Then too, double letters and diphthongs might have deserved a value less than the combined values of their individual letters, because of the Gestalt effect of their contribution to the pattern of the word. A third weakness of this measure might be attributed to the fact that the original study concerned the faces of printing types so the rank orders found might not apply to the faces of the typewriter type used in this experiment. Another experiment utilizing the technique employed in this study but using individual letters, double letters, and diphthongs could give a better measure of legibility.

How does one judge whether a word should be counted as "emot-

ional" or not? In this experiment the selection of the words called "emotional" was based on the judgment of a panel of ten raters. The criterion was taken as being the listing by even one judge that a word was emotional.¹ This is not the only criteria that could have been used. For instance, selection could have been made of the twenty-five words receiving the highest number of judgments. Or more judges could have been used and words that were not picked by these ten raters might have been included if twenty raters were used. One can not say unequivocally that a word does or does not "carry an affective tone." The correct picture shows that the matter of emotionality is a continuum from extremely emotion-arousing to completely innocuous. Where any particular word would fall on that continuum depends on the past experience of each person. By using impartial judges instead of the subjects themselves to assess the emotional quality of the words, the experimenter introduced the weakness of using averages. On the other hand, even an elaborately controlled experiment correlating the personal assessment of involvement with the results can not give perfect results, as P. G. Daston found when he planned to use reaction times to non-sexual words as a common baseline from which to make comparisons among the groups of subjects reacting to homosexual and heterosexual words, that, "The finding that statistically significant differences existed among groups

¹The frequency of checks for each word is given in Appendix I, p. 32.

in their recognition times to non-sexual words necessitated statistical treatment of the data beyond that which had been provided for in the original design."² Daston continued, "It seemed likely that unknown, uncontrolled variables had affected the groups of S's differently in terms of their word recognition times."³ It did not surprise this writer that "...variables had affected the groups of S's..." when she examined the list of "neutral words" and found murder, lynch, death, and agony!

A possible explanation of the lack of confirmation of the experimental hypothesis that there would be a real difference in the average threshold for the emotional and non-emotional words might be in the set given the subjects by the instructions. The subjects were told to be comfortable and that there would be no cause for embarrassment during the experiment. The results of this experiment were in agreement with those of Freeman⁴ who found that when the subjects were set to expect taboo words the results did not differ from those of the control group. In this experiment the subjects did not expect to be emotionally involved and so reacted cognitively rather than affectively. Perhaps what was lacking might not have been the effect of the emotional tone, but the necessity of reacting to it.

²P. G. Daston, Perception of homosexual words in paranoid schizophrenia. Percept. mot. Skills, 1956, 6, 45-55, p. 51.

³Ibid. p.51.

⁴Freeman, p. 288.

CHAPTER V

SUMMARY

A problem of importance for the understanding of human behavior is the one that concerns the factors influencing perception. Much research has been done regarding the factors in the area of central dynamics, such as the motivational and attitudinal determinants. How these determinants work, or even if they do, has recently been the subject of a lively controversy in psychological publications. Besides pointing out the above facts, this paper also cited studies that started with the same problem and ended with results that conflicted with each other.

The present experiment was conducted in an effort to further the understanding of the inter-relationships between the emotional meaning of stimulus words and the other attributes of the words, such as the relative familiarity and legibility of the words.

A list of one hundred, six-letter words was divided into groups of emotional and non-emotional words, and was presented by means of a tachistoscope to thirty naive subjects.

The results were analyzed for correlations between familiarity of each word and its perception threshold, and between the legibility of its component letters and its threshold. These cor-

relations were found to be positive, but slight. An analysis of the variances between the two groups of words showed that the non-emotional words had greater ranges of scores than did the emotional words. A t test of the means of the two groups showed no significant difference.

In the discussion the writer pointed out some of the sources of error in such experiments and suggested further research.

The conclusion pointed out that the experimental hypothesis of a real difference between the perception thresholds for emotional words as compared with those of the non-emotional words was not sustained. The correlated hypotheses that near zero, or slight positive, correlations would be found for familiarity and legibility were sustained. The hypothesis that the variance of scores for emotional words would be greater than that for the non-emotional words was refuted with the results in the opposite direction.

CHAPTER VI

CONCLUSION

The results of this experiment failed to confirm the hypothesis that a real difference would be found between the perception thresholds for emotional and non-emotional words.

Two correlated hypotheses were sustained. (1) A near zero correlation was found between the familiarity of the word and the difficulty of reading that word, and (2) the correlation between the legibility of the word according to the conformation of the individual letters and such difficulty was found to be positive, but not significant.

The results of this experiment were directly contrary to the fourth hypothesis that individual differences among subjects would be reflected in greater variances of responses to emotional words than to neutral ones.

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APPENDIX I

THE ONE HUNDRED STIMULUS WORDS

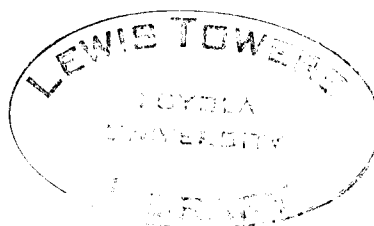
The 100 stimulus words used in this study of the effect of emotional meaning on word perception are given in Tables IV and V. Table IV, on this page, gives the 46 emotional words and the frequency of the ten judges who rated the words as carrying an affective tone. Table V, on page 33, gives the 54 non-emotional words.

TABLE IV
EMOTIONAL STIMULUS WORDS

Words	f.	Words	f.	Words	f.	Words	f.	Words	f.
Nipple	7	Iceicle	2	Gentle	3	Bungle	3	Renkle	1
Coddle	5	Gamble	2	Jostle	2	Middle	1	Tickle	7
Dimple	3	Battle	3	Paddle	1	Cuddle	10	Stable	1
People	5	Futile	4	Couple	3	Virile	7	Rustle	1
Jangle	1	Docile	1	Fondle	10	Finale	2	Jumble	1
Bottle	2	Baffle	1	Nuzzle	3	Mangle	3	Pimple	5
Impale	3	Handle	1	Defile	8	Tattle	3	Reville	4
Little	1	Girdle	4	Huddle	2	Suckle	5	Piddle	1
Bubble	2	Fickle	5	Rumble	2	Bustle	3	Muzzle	1
Nestle	5			total f. = 150					

TABLE V
NON-EMOTIONAL STIMULUS WORDS

Words	Words	Words	Words	Words
Cattle	Kirtle	Waffle	Dandle	Dingle
Circle	Wandle	Double	Fistle	Boodle
Mizzle	Foible	Dapple	Dartle	Creole
Hubble	Candle	Runkle	Oracle	Simile
Tittle	Jirble	Pattle	Daddle	Pebble
Hackle	Cuttle	Mickle	Keckle	Noddle
Fangle	Hurdle	Gaggle	Kittle	Raddle
Buddle	Niggle	Kentle	Gurgle	Tamale
Faddle	Muddle	Rubble	Justle	Fuddle
Mottle	Pestle	Arable	Deckle	Wattle
Heddle	Rabble	Simple	Semble	



APPENDIX II

RAW SCORES

The raw scores were obtained by presenting 100 stimulus words to thirty subjects, and represent the total number of presentations needed by each word for all the subjects to correctly identify it. Table VI, on pages 34, 35, and 36 below, gives the words in the order they were presented, the raw scores earned by each word, the ranges between subjects' individual tallies, the mean and median scores, and the class values assigned to each word according to the code given in Table I on page 15 above for the relative familiarity and in Table II on page 16 above for the relative legibility.

TABLE VI
RAW SCORES AND RANGES, MEAN AND MEDIAN SCORES, AND
FAMILIARITY AND LEGIBILITY CLASSES FOR ALL WORDS

Words	Total scores	Range	Mean scores	Median scores	Famil. class	Legib. class
Cattle	103	1-22	3.4	2.16	2	2
Circle	261	1-81	3.7	2.75	1	4
Boodle	380	2-53	12.7	7.50	9	6
Nipple	99	1-20	3.3	2.00	8	4
Oracle	272	1-73	9.1	3.50	4	5
Coddle	136	1-23	4.5	2.75	6	4
Dimple	83	1- 8	2.8	2.13	5	2

TABLE VI (continued)

RAW SCORES AND RANGES, MEAN AND MEDIAN SCORES, AND
FAMILIARITY AND LEGIBILITY CLASSES FOR ALL WORDS

Words	Total scores	Range	Mean scores	Median scores	Famil. class	Legib. class
People	133	1-22	4.4	2.36	1	6
Buddle	413	1-64	13.8	4.50	10	7
Jangle	100	1-25	3.3	2.21	6	4
Bottle	143	1-23	4.8	2.27	2	5
Impale	155	1-27	5.2	3.50	7	1
Little	38	1- 4	1.3	1.12	1	1
Wattle	152	1-31	5.1	2.70	8	1
Kirtle	361	1-47	12.0	6.00	7	6
Bubble	402	1-55	13.4	8.50	3	10
Icicle	118	1-39	3.9	2.08	6	1
Gamble	157	1-23	5.2	2.50	4	5
Simile	326	2-58	10.9	6.00	6	3
Battle	145	1-43	4.8	2.50	1	4
Mickle	219	1-28	7.3	4.83	10	3
Futile	158	1-22	5.3	3.21	5	4
Niggle	305	1-44	10.2	4.83	10	6
Docile	181	1-42	6.0	2.40	6	3
Rubble	406	1-42	13.5	7.25	7	10
Justle	86	1-7	2.9	2.50	8	5
Baffle	120	1-19	4.0	2.90	5	6
Handle	94	1-13	3.1	2.00	2	5
Girdle	146	1-32	4.9	2.83	4	6
Wandle	187	1-25	6.2	3.10	10	3
Mizzle	218	1-27	7.3	4.30	10	4
Hubble	353	1-61	11.8	4.50	10	9
Fickle	53	1-3	1.8	1.73	5	5
Pebble	220	1-36	7.3	2.50	4	9
Keckle	112	1-9	3.7	3.00	10	8
Gentle	43	1-3	1.4	1.29	1	7
Jostle	78	1-10	2.6	1.86	5	5
Tamale	142	1-12	4.7	4.10	10	1
Paddle	80	1-23	2.7	1.68	4	3
Couple	112	1-23	3.7	1.86	2	4
Fondle	191	1-63	6.4	1.96	7	6
Nuzzle	87	1-21	2.9	2.00	8	8
Waffle	66	1-6	2.2	1.97	5	3
Double	54	1-5	1.8	1.59	1	7
Foible	83	1-9	2.8	2.34	7	6
Defile	134	1-11	4.5	3.00	5	5
Tittle	99	1-15	3.3	1.75	8	1

TABLE VI (continued)

RAW SCORES AND RANGES, MEAN AND MEDIAN SCORES, AND
FAMILIARITY AND LEGIBILITY CLASSES FOR ALL WORDS

Words	Total scores	Range	Mean scores	Median scores	Famil. class	Legib. class
Hackle	124	1-31	4.1	2.30	8	5
Noddle	171	1-34	5.7	2.90	9	6
Nestle	204	1-43	6.8	2.30	5	4
Huddle	179	1-32	6.0	2.83	4	5
Faddle	103	1-21	3.4	2.04	10	4
Rumble	242	1-38	8.1	3.25	4	7
Bungle	311	1-48	10.4	5.50	7	9
Middle	127	1-22	4.2	2.50	1	2
Heddle	397	1-70	13.2	7.50	10	7
Dandle	113	1-15	3.8	3.00	7	5
Cuddle	111	1-23	3.7	2.07	5	4
Dapple	124	1-15	4.1	3.00	6	3
Candle	64	1-8	2.1	1.50	3	4
Jirble	389	2-50	12.9	6.50	10	6
Virile	128	1-23	4.3	3.05	7	4
Fangle	130	1-28	4.3	2.43	10	6
Kittle	75	1-9	2.5	2.14	10	3
Finale	118	1-43	3.9	2.33	7	4
Mangle	126	1-28	4.2	2.72	5	4
Tattle	64	1-4	2.1	2.00	8	1
Fuddle	80	1-11	2.7	2.17	8	5
Arable	148	1-24	4.9	3.70	7	6
Suckle	169	1-22	5.6	3.25	5	8
Bustle	138	1-25	4.6	2.42	4	8
Fistle	169	1-24	5.6	2.83	10	5
Dartle	263	1-70	8.8	4.17	10	4
Tickle	52	1-3	1.7	1.71	4	3
Pattle	104	1-17	3.5	2.25	10	2
Cuttle	76	1-12	2.5	.79	7	3
Hurdle	125	1-19	4.2	3.00	6	7
Rankle	124	1-43	4.1	2.38	6	8
Kentle	99	1-16	3.3	2.63	10	8
Muddle	141	1-42	4.7	2.83	6	3
Stable	88	1-22	2.9	2.08	3	7
Mottle	190	1-37	6.3	2.75	6	2
Rustle	134	1-25	4.5	2.64	4	8
Jumble	74	1-12	2.5	1.64	5	4
Semble	198	1-20	6.6	4.00	10	8
Dingle	64	1-5	2.1	2.06	7	5

TABLE VI (continued)

RAW SCORES AND RANGES, MEAN AND MEDIAN SCORES, AND
FAMILIARITY AND LEGIBILITY CLASSES FOR ALL WORDS

Words	Total scores	Range	Mean scores	Median scores	Famil. class	Legib. class
Pimple	76	1-7	2.5	2.33	7	2
Creole	316	2-67	10.5	5.50	6	7
Runkle	127	1-14	4.2	3.36	10	9
Daddle	109	1-15	3.6	2.93	10	3
Reville	139	1-27	4.6	2.78	5	6
Gaggle	123	1-14	4.1	3.00	10	6
Raddle	139	1-42	4.6	3.00	10	5
Gurgle	160	1-25	5.3	4.25	5	8
Piddle	196	1-24	6.5	3.17	10	3
Muzzle	125	1-20	4.2	2.30	5	6
Pestle	224	1-59	7.5	2.90	6	7
Deckle	139	1-25	4.6	2.83	10	7
Rabble	259	1-28	8.6	6.50	5	9
Simple	84	1-23	2.8	1.80	1	4

APPENDIX III

TOTAL LIST OF 270 SELECTED WORDS

Webster's Unabridged Dictionary was searched for words of like composition, containing six letters and ending in le. These words were then coded for relative familiarity in classes as shown in Table I on page 15 above, and coded for legibility in classes as shown in Table II on page 16 above. Table VII on this and the following pages gives the total list of 270 selected words and the classes, designated "F." for familiarity and "L." for legibility.

TABLE VII

FAMILIARITY AND LEGIBILITY CLASSES OF SELECTED WORDS

Words	F.	L.	Words	F.	L.	Words	F.	L.
Alible	10	3	Bottle	2	5	Bustle	4	8
Arable	7	6	Bridle	4	7	Cackle	5	4
Babble	5	9	Bubble	3	10	Candle	3	4
Baffle	5	6	Buckle	5	7	Castle	2	4
Battle	1	4	Buddle	10	7	Cattle	2	2
Beagle	7	8	Bumble	10	7	Chicle	10	3
Beetle	4	9	Bundle	3	8	Circle	1	4
Boodle	9	6	Bungle	7	9	Cobble	6	8

TABLE VII (continued)

FAMILIARITY AND LEGIBILITY CLASSES OF SELECTED WORDS

Words	F.	L.	Words	F.	L.	Words	F.	L.
Cockle	6	5	Dibble	8	7	Fondle	7	6
Coddle	6	4	Diddle	8	3	Foozle	10	6
Coffle	10	5	Dimple	5	2	Fuddle	8	5
Couple	2	4	Dindle	10	5	Fumble	5	6
Cradle	4	5	Dingle	7	5	Futile	5	4
Creole	6	7	Docile	6	3	Gabble	6	8
Cuddle	5	4	Dottle	10	3	Gaffle	10	6
Cuttle	10	3	Double	1	7	Gaggle	10	6
Cuttle	7	3	Edible	5	7	Gamble	4	5
Dabble	5	7	Facile	7	3	Garble	8	8
Daddle	10	3	Faddle	10	4	Gargle	8	7
Daffle	10	5	Fangle	10	6	Gentle	1	7
Dandle	7	5	Feeble	4	10	Giggle	5	6
Dangle	5	6	Fettle	9	5	Girdle	4	6
Dapple	6	3	Fickle	5	5	Gobble	5	9
Darkle	10	7	Fiddle	5	4	Goggle	7	7
Dartle	10	4	Finale	7	4	Guggle	10	8
Dawdle	7	2	Fissle	10	8	Gurgle	5	8
Dazzle	4	6	Fistle	10	5	Guttle	10	4
Deckle	10	7	Fizzle	9	6	Guzzle	8	8
Defile	5	5	Foible	7	6	Hackle	8	5

TABLE VII (continued)

FAMILIARITY AND LEGIBILITY CLASSES OF SELECTED WORDS

Words	F.	L.	Words	F.	L.	Words	F.	L.
Haggle	7	6	Joggle	8	5	Mettle	6	3
Handle	2	5	Jostle	5	5	Mickle	10	3
Heckle	8	7	Juggle	5	6	Middle	1	2
Heddle	10	7	Jumble	5	4	Mingle	3	4
Hirple	10	6	Jungle	4	6	Mizzle	10	4
Hobble	5	9	Justle	8	5	Motile	8	1
Hopple	10	5	Keckle	10	8	Mottle	6	2
Hubble	10	9	Kemple	10	6	Mobile	6	4
Huckle	10	6	Kentle	10	8	Muckle	10	4
Huddle	4	5	Kettle	3	6	Muddle	6	3
Humble	3	6	Kindle	4	6	Muffle	5	4
Hurdle	6	7	Kirtle	7	6	Mumble	5	4
Hurtle	7	6	Labile	10	3	Muscle	3	5
Hustle	5	7	Liabile	4	3	Muzzle	5	6
Icicle	6	1	Little	1	1	Myrtle	5	4
Impale	7	1	Locale	9	2	Needle	3	9
Inhale	5	4	Luggle	10	5	Nestle	5	4
Jangle	6	4	Mangle	5	4	Nettle	5	2
Jiggle	8	4	Mantle	4	3	Nibble	5	8
Jingle	5	4	Marble	3	6	Niggle	10	6
Jirble	10	6	Meddle	4	4	Nimble	5	5

TABLE VII (continued)

FAMILIARITY AND LEGIBILITY CLASSES OF SELECTED WORDS

Words	F.	L.	Words	F.	L.	Words	F.	L.
Nipple	8	4	Popple	10	3	Ribble	10	9
Noddle	9	6	Puckle	10	5	Riddle	4	5
Nodule	7	6	Pottle	8	3	Riffle	8	6
Noodle	7	6	Puddle	5	5	Rimble	10	3
Nozzle	6	8	Purgle	10	7	Rindle	10	6
Nubble	10	10	Purple	3	6	Ripple	4	5
Nuzzle	8	8	Puzzle	3	7	Rubble	7	10
Oracle	4	5	Rackle	10	6	Ruckle	10	7
Oriole	6	5	Rafale	10	5	Ruddle	10	6
Paddle	4	3	Rabble	8	9	Ruffle	4	8
Parole	5	5	Raddle	10	5	Rumble	4	7
Pattle	10	2	Raffle	8	6	Rumple	5	5
Pebble	4	9	Raible	10	6	Rundle	10	8
Peddle	6	6	Ramble	5	6	Runkle	10	9
Peeble	10	9	Rankle	6	8	Rustle	4	8
People	1	6	Rattle	3	4	Rutile	10	5
Pestle	6	7	Razzle	10	8	Saddle	3	5
Pickle	4	4	Reddle	10	8	Sample	4	4
Piddle	10	3	Regale	7	8	Sedile	10	7
Piffle	9	4	Reville	5	6	Semble	10	8
Pimple	7	2	Rickle	10	6	Semple	10	6

TABLE VII (continued)

FAMILIARITY AND LEGIBILITY CLASSES OF SELECTED WORDS

Words	F.	L.	Words	F.	L.	Words	F.	L.
Senile	8	8	Temple	2	4	Virile	7	4
Siecle	9	6	Tickle	4	3	Wabble	8	6
Sickle	5	6	Tingle	5	5	Waddle	6	2
Siffle	10	6	Tinkle	5	5	Waffle	5	3
Simile	6	3	Tipple	7	2	Waggle	8	4
Simple	1	4	Tittle	8	1	Wandle	10	3
Single	1	7	Toddle	7	4	Wangle	8	4
Sizzle	7	8	Toggle	8	6	Warble	5	5
Souple	10	7	Tootle	10	3	Wattle	8	1
Stable	3	7	Topple	5	3	Wiggle	6	4
Staple	5	5	Tousle	7	6	Wimble	8	2
Stifle	4	5	Touze	10	5	Wimble	8	1
Subtle	4	8	Treble	5	9	Winkle	8	4
Suckle	5	8	Trifle	4	5	Wobble	7	7
Supple	5	6	Triple	5	4			
Swiple	10	4	Tumble	3	4			
Tackle	4	4	Turtle	4	5			
Tamale	10	1	Tussle	7	8			
Tangle	4	5	Unable	3	7			
Tattle	8	1	Usable	7	8			

APPENDIX IV

PRE-TEST PRACTICE WORDS

Following are the twenty words used in the pre-test practice period:

SIECLE	GOBBLE
MUMBLE	REGALE
PUCKLE	SADDLE
ALIBLE	MARBLE
TOOTLE	TURTLE
MYRTLE	RIPPLE
RATTLE	MEDDLE
GUZZLE	HOBBLE
BAFFLE	NOODLE
SWIPLE	LOCALE

APPROVAL SHEET

The thesis submitted by Frances Herb has been read and approved by three members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the thesis is now given final approval with reference to content, form, and mechanical accuracy.

The thesis is therefore accepted in partial fulfillment of the requirements for the Degree of Master of Arts.

May 24, 1962
Date

Vincent W. Herb
Signature of Adviser