MASTER'S THESIS

M-1063

CAMPBELL, Margaret Mary
THE MEASUREMENT OF SEMANTIC SATIATION.

Carleton University, M.A., 1966
Language and Literature, general

University Microfilms, Inc., Ann Arbor, Michigan

THE MEASUREMENT OF SEMANTIC SATIATION

by Margaret Mary Campbell

Thesis presented to the Faculty of
Graduate Studies of Carleton University
in partial fulfillment of the require-
ments for the degree of Master of Arts

Ottawa, October, 1966

THE MEASUREMENT OF SEMANTIC SATIATION

by Margaret Mary Campbell

Abstract of a thesis presented to the
Faculty of Graduate Studies of Carleton
University in partial fulfillment of the
requirements for the degree of Master
of Arts

Ottawa, October, 1966

ABSTRACT

Demonstration of semantic satiation, or loss of meaning of words with repetition was attempted. The satiation treatment was 15 seconds overt repetition. No effects specifically due to this treatment were found when meaning was defined by polarity ratings on the semantic differential. An increase in intensity of meaning after three different treatments, relative to a control was considered to be due to the interval between presentation of the stimulus and the rating response.

Meaning, defined as association value, appeared to be reduced by overt word repetition, though visual exposure alone to a word resulted in increased association values, relative to a control.

The satiation treatment resulted in the production of more uncommon first associations to words than were given by subjects in a control condition. Commonness was defined in terms of normative data (presented in appendix) for the experimental population.

ACKNOWLEDGEMENTS

This thesis was prepared under the supervision of Assistant Professor Marilyn Elizabeth Marshall, Ph.D., of the Department of Psychology of Carleton University, Ottawa.

The writer is indebted to Hildegard Corbet, a fellow sufferer, for her help in tabulating the normative data used in this study and for her assistance in testing the subjects of experiment 11.

TABLE OF CONTENTS

Chapter

I.	INTRODUCTION AND REVIEW OF THE LITERATURE	1
II.	EXPERIMENTAL DESIGN	16
	Experiment 1	16
	Method	20
	Subjects	20
	Materials and Apparatus	21
	Procedures	22
	Experiment 11	24
	Method	27
	Normative Data	27
	Subjects	29
	Materials	29
	Procedures	29
III.	PRESENTATION OF RESULTS	31
	Experiment 1	31
	Experiment 11	39
IV.	DISCUSSION OF RESULTS	51
	Experiment 1	51
	Experiment 11	60
	SUMMARY	68
	BIBLIOGRAPHY	70

Appendix

1.	Instructions to the groups of experiment 1	72
2.	Instructions for the collection of normative data	80
3.	Instructions to the groups of experiment 11	81
4.	Normative data for experiment 11	84
5.	Data from experiment 11: first associations	92

LIST OF TABLES

Table	page
I. The Summary Table of the Analysis of Variance Performed on the Overall Mean Polarity Scores	34
II. The Summary Table of the Analysis of Variance Performed to Include the First Half and the Second Half of Testing Effect	37
III. The Summary Table of the Analysis of Variance Performed on the Mean Number of Associations to Ten Words	43
IV. The Association Value of Ten Words (Normative Data), the Association Values Obtained Under Three Experimental Conditions and the Overall Mean Association Values	47
V. The Expectancy Table of Common and Uncommon Associations Using Pooled Data from the Two Exposure Groups	49
VI. The Summary Table of the Analysis of Variance Performed on the Data of the Non Pretested Subgroups of Experiment 1	53
VII. The Means and Variances for the Eight Subgroups of Experiment 1	55
VIII. A Summary of the Individual Comparisons Made Between the Treatment Group Means of Experiment 1	57

LIST OF FIGURES

Figure		page
1.	A Schematised Representation of the Posttest Only Design	13
2.	A Schematised Representation of Solomon Four Group Design	13
3.	A Schematic Representation of the Design of Experiment 1	19
4.	A Schematic Representation of the Design of Experiment 11	28
5.	Overall Mean Post Treatment Polarity Scores for the Eight Subgroups of Experiment 1	33
6.	Mean Polarity Scores of the First Half and Second Half of the Post Treatment Ratings For the Eight Subgroups in Experiment 1	36
7a	Mean Number of Associations Made to Five Words	41
7b	Mean Number of Associations Made to Five Words	42
8.	The Mean Number of Associations Made to Ten Words	46
9.	A Diagramatic Representation of the Effects of Varied Levels of Stimulus Presentation on the Association Values	67

CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

The "Meaning of Meaning" has been mainly a philosophic concern in the past and while so-called meaningful material has been used in many psychological studies, the precise definition of this term has been left to non experimental thinkers. As operationalism has been recognized as a necessary assumption of psychological science, the position of meaning has become more clear. Meaning is considered to be an intervening variable relating a sign to a significate, relating a word, either visually or auditorily presented, to an object and this relationship is assumed to be subject to the laws of conditioning. The concept of abstract ideas, of the relationship of signs to "unpointatables" can be inferred to be dependent on differential reinforcement by the linguistic and social experience of the individual. Meaning, then, is a more complex process than a simple one-to-one relationship of sign to object and varies, for any word, from individual to individual. Osgood, Tannenbaum and Suci (1957, p. 26) write

...the meaning of a sign in a particular context and to a particular person at a particular time (...) is the representational mediation process which it elicits.

There have been many ways of defining this representational mediation process operationally: by the

measurement of the galvanic skin response, by salivary reaction, by action potential in striate muscle, by application of various conditioning and transfer of training procedures and by perceptual methods. All of these have added something to the general conception of meaning, but all have lacked precision and reliability. What seems to be required for a more sophisticated definition, is a behavior that is recordable, countable and reliable under a variety of conditions. In 1952 Noble reported on (m) meaning, expressed as the average number of associations made by a group of subjects to a given word in 60 seconds. This measure, now called more commonsensically association value, did not appear to measure the denotative meaning but rather the connotative meaning of a word. The difference between the two is illustrated by the answers to the questions: "What does this word mean?" (denotative meaning) and "What does this word make you think of?" (connotative meaning). The meaning of "sophisticated" is not "lady" according to lexicographers, though it does contribute to the word's association value.

Another measure of meaning in the associative sense employs the commonness or uncommonness of the associations which are made to a word. This measure was developed as a diagnostic aid in the study of psychotics by Kent and Rosanoff (1910). Their technique and even their results have been used widely since, (e.g. Howes and Osgood, 1954;

Smith and Raynor, 1956) though the rationale for this use is questionable, considering the differences in populations and the changes in the cultural environment since the turn of the century. However, the commonness of association, and in the case of Kent and Rosanoff the commonness of the first association, can be considered to be another measure of the meaning of a word.

In 1957 Osgood, Tannenbaum and Suci published the results of a series of studies which used a measure of meaning that they called the Semantic Differential. This concept involves the consideration of a multidimensional semantic space in which each word for each individual has its coordinates measured on a series of dimensions delineated by polar adjectives, such as good/bad, fast/slow, meaningful/meaningless and so on. Many words and abstract concepts, such as truth, father, justice, and child were evaluated on a variety of scales by different populations and the results were factor analysed. Three major dimensions of semantic space, which Osgood et al. called evaluation, activity and potency were disclosed by the factor analytic technique and these results were found to be reliable over many types of population (Jenkins and Wallace, 1958).

There are, then, at least three available operational definitions of meaning, none of which measures meaning in the lexical sense, but all of which can be considered to

be measures of past associations and connotations of the representational mediation process. In summary, these are a) the commonness of the first association to a word, b) the number of associations to a word and c) that point in semantic space specified by a series of scalar judgements.

As these measures of meaning became available, there appeared a number of experimental studies that used meaning as the independent variable, but until the last 10 years only introspective studies (e.g. Bassette and Warne, 1919; Don and Weld, 1924) are found in the literature which is concerned with the loss of meaning of a word, associated with repetition of that word. This condition of loss of meaning is called semantic satiation and the criterion for it's judged presence was, until recently, subjective. That is, the subject of the experimental study typically stopped repeating the word in question when he noticed that it had become meaningless to him. Furthermore, in these studies, many of which came from Titchener's laboratory, no clear operational definition of meaning was employed, even though the weighty context theory of meaning can be seen as a natural forerunner of the later associationist definitions. A study by Severence and Washburn (1907) used the loss of associative power to words as the measure of semantic satiation produced by visual fixation of the stimulus word. In 1956 Smith and Raynor investigated the effects of

prolonged exposure to a word, using as a dependent measure, the uncommonness of associations produced, compared to those elicited from subjects who had only a brief exposure to a word. The results of the latter study were interesting in that experimental subjects gave predominantly more uncommon associations, as defined by the Kent-Rosanoff norms, than did control subjects.

In 1960 Lambert and Jakobovits published a study in which they investigated the effect of overt repetition of a word on it's meaning, as defined by measurement on semantic differential scales. Their technique involved the pretest rating of words, fast repetition of each word individually for 15 seconds, then rating the repeated word again. They used five words and each of the major dimensions (evaluative, potency and activity) of semantic space were represented by three scales. All subjects in this study rated all the words on all the scales (pretest rating occurred at time 1). Subjects in the experimental groups then repeated a word aloud as fast as possible for 15 seconds and rated it again (post treatment rating at time 2). This experimental procedure was carried out with respect to all words on all the scales. The controls used in this first experiment were 1) a silence control treatment, in which the subjects rated all the words on all the scales (pretest rating at time 1), then saw one word and waited for 15 seconds before rating

it for the second time. This was done for each word on all scales; 2) an irrelevant word control treatment in which the procedures were similar to those of the experimental group, except that the repeated word was a word different from the experimental word that was rated at time 2, and 3) a retest treatment group in which the subjects rated the words twice using the procedures of time 1 each time. Only in the experimental group was there a significant difference between pretest and post treatment ratings. A second study was done to demonstrate that this satiation effect was of a cognitive nature rather than a peripheral or muscular effect, by having the control subjects repeat "gro-ny" and rate "negro". The peripheral mechanisms involved in saying "gro-ny" are the same as in saying "negro" (gro ne gro ne gro ne). The second control group in this study repeated nonsense words, such as "blatu" and then rated "house". Again, the only significant difference in ratings at time 1 and time 2 was found in the experimental group. An interesting finding in the second study was that the satiation effect persisted for five minutes after repetition. Lambert and Jakobovits concluded that their technique of verbal satiation and the measurement of its effect was demonstrated reliably and they became involved in a programme of research directed towards investigating the variables associated with the phenomenon of semantic satiation defined by the overt repetition of a

word and objectively measured by the changes in ratings on semantic differential scales. They and their associates have used these methods in studies involving compound and coordinate bilinguals (Jakobovits and Lambert, 1961), simple addition tasks (Jakobovits and Lambert, 1962a), the effects of satiating a mediator on subsequent learning where a non satiated mediator commonly results in positive transfer (Jakobovits and Lambert, 1962b), satiation of response words in paired associate learning (Kanungo, Lambert and Mauer, 1962), satiation and meaningfulness, defined as association value above (Kanungo and Lambert, 1963a), satiation of stimulus and response items in paired associate learning (Kanungo and Lambert 1963b), the effect of amount of repetition on meaning and paired associate learning (Kanungo and Lambert, 1964), the stimulus characteristics as determinants of semantic change with repeated presentation (Jakobovits and Lambert, 1964) and the satiation of words and numbers, using words and digits (Messer, Jakobovits, Kanungo and Lambert, 1964). In all these studies except the last, the technique used and the measure of the effect was found to be significant and reliable. In the last study which used the same four groups and procedure, no dependable differences were found between the experimental group and the different word control group, though the three control groups did not differ in themselves. In the report of

Kanungo and Lambert (1963b) it was suggested that low meaningful words were not changed in their meaning by this procedure of overt repetition. In summary then, overt repetition of a word appeared to change the meaning of that word, as measured on the semantic differential and inferred from changes in the performance of subjects in learning situations, at least when the words employed were relatively high in initial meaningfulness.

In 1963 Yelen and Schulz attempted a replication of Lambert and Jakobovits' original experiment and were not able reliably to demonstrate the satiation effect of verbal repetition on the meaning of words, using changes in the ratings on semantic differential scales as a measure of satiation. On more detailed analysis of their results, they were able to distinguish between satiation effects or neutralization of connotative meaning on some scales and generation effects, described as an increased connotative extremeness induced by repetition, on others. The rating of words on semantic scales is accomplished typically by instructing the subject to point to the position on a seven point scale that he feels exemplifies his concept of the word on that particular bipolar scale. The middle interval of the scale is considered to be neutral, indicating "meaningless" on one dimension. The end positions of a scale are assumed to reflect intensity of meaning and are

arbitrarily named positive and negative. Thus a word rated at the position labeled three is presumed to have less intensity of meaning than a word rated at the position 6. If the scale was labelled from negative to positive, the positions referred to above would be called minus one and plus two, respectively. Disregarding the algebraic sign of a position named in this way, allows a rating of intensity of meaning or polarity of a word.

For Yelen and Schulz, semantic generation implied that words which are originally negative, will on repetition become more negative and words which are originally positive will on repetition become more positive, as measured on certain scales. In a subsequent investigation (Yelen and Schulz, 1963, experiment 4), these results were repeated but it was noted that which of these phenomena, satiation or generation occurred, appeared to depend to some extent on the initial intensity of the to-be-rated words. The suggestion that the "goodwill" of the subjects was involved in the change of rating was also made, and it was reported that 16 of the 30 subjects involved, when asked what they thought the purpose of the experiment to be, indicated that changes in their ratings of the words as the result of repetition were the purpose. A subject who, in the preexperimental rating, has placed the word "mother" at the most extreme positive position on the scale beautiful/ugly and who wishes to

change his rating after the repetition procedures as a result of his perception of the purpose of the experiment, has no choice but to rate "mother" less positively. This would be considered as evidence of semantic satiation, as the rating of the word has decreased in intensity or polarity from the pretest to the post treatment period. Yelen and Schulz have called this "a regression-like phenomenon" and have indicated that "satiation" scales are those on which the prerepetition ratings were relatively intense and "generation" scales were those on which initial ratings were relatively neutral. This conclusion implied that both satiation and generation may be merely regression effects, artifacts of the subject's perception of the experimental situation rather than effects of induced changes in the experimental variables.

In 1965, Schulz, Weaver and Radtke published a study which undertook to preclude the confounding of the effects by a possible regression-like effect. This study which used the same materials as experiment 4 (Yelen and Schulz, 1963) employed a "posttest only" design (Campbell, 1957), in which the subjects did not make pretest ratings and the experimental group's post treatment ratings were compared with the ratings of a control group, which were also made without a pretest. The results of this study supported the hypothesis of a regression-like phenomenon, by showing no significant

difference between the means of the experimental and control group ratings, either with ordinary scores or with the polarity scores advocated by Lambert and Jakobovits in an unpublished critique of Yelen and Schulz (1963) (Amster, 1964). Schulz and his associates pointed out that these results did not deny the phenomenon of semantic satiation, but did imply that the "pre-post semantic rating technique may not be a satisfactory method for assessing the effects on connotative meaning that may result from verbal repetition."

As the effect of verbal repetition has been demonstrated by other workers (e.g. Fillenbaum, 1963; Miller, 1963; Warren, 1961) it would seem of interest to study in more detail the measurement of the effects of this procedure, particularly with reference to the use of semantic differential scales. The measurement of connotative meaning on the semantic differential is objective and reliable in many situations and this instrument appears suitable for measuring the change in meaning that may occur after a treatment such as verbal repetition.

As indicated previously, the 1965 study of Schulz et al. used a design called the posttest only design, which has been described as being peculiarly useful in the social sciences, because in it the effect of the first rating is explicitly taken into account. (Campbell, 1957). (cf. figure 1.)

Comparisons are made between groups, the usual assumptions of random assignment to groups of subjects from an initially homogeneous population being made, with the specific instruction that assignment to groups must be made at time A. This controls for, but does not measure the effect of a pretest and other variations in the social history of the subjects. This was the procedure that Schulz et al. (1965) followed, X being 15 seconds of fast oral repetition of a word and O being rating on semantic scales, O_2 representing a pretest measure and being compared with O_1 , to assess the effect of treatment X.

Campbell (1957) also described a design that would demonstrate the effect of a pretest and the possible "regression-like" effects of a pretest on post treatment ratings. This design, called a Solomon four group design is shown in figure 2. Only the measures O_2 , O_4 , O_5 and O_6 are used in the analysis of the total variance. The means of the ratings O_2 and O_4 compared with the means of the ratings O_5 and O_6 reflect the effect of taking a pretest on the post treatment ratings and the comparison of the means of the ratings O_4 and O_6 with the means of the ratings O_2 and O_5 isolates the effect of the treatment. All comparisons are between subjects comparisons. This was the basic design that was followed in the first part of the present study,

Gr.	A....X....	O_1	
Control	A.....	O_2	where A refers to a point in time X is a treatment O refers to measures.

Figure 1. A schematised representation of the posttest only design.

Gr. 1	O_1 ...X....	O_2	
Gr. 2	O_3	O_4	
Gr. 3	- ...X....	O_5	
Gr. 4	-	O_6	where O represents a rating X is the treatment.

Figure 2. A schematised representation of Solomon four group design, developed for use in attitude change studies.

which attempted to demonstrate the effect that taking a pretest has on the post treatment ratings of the connotative meaning of words, as measured on the semantic differential.

There are other measures of meaning which may be hypothesized as sensitive to the changes in meaning that are subjectively apparent after a period of overt repetition of a word. These include the association value of a word (Noble, 1952) and the commonness of the first association to a word. Kanungo and Lambert (1963a) using Noble's method of gathering the normative data, found that in a between subjects comparison, the association value of a word decreased after the satiation treatment of oral repetition. A within subjects comparison did not demonstrate an effect of the satiation procedures on the response measure. This result was attributed to the facilitating effect of memory on the second (post treatment) making of associations.

Smith and Raynor (1956) found that subjects who had fixated a word for a prolonged period (20 seconds) produced more uncommon first associations to the word than did the control subjects. They defined as uncommon a first response to a word that occurred less than 35 times in the responses of 1,000 normal subjects. Their normative data were that of Kent and Rosanoff (1910). As forty-six years elapsed between the collection of the norms for this study and the experiment

itself, a period which included the development of the aeroplane, the emergence of the labour movement, two world wars, the advent of communism as a political force and the invention of radio and television, it seemed desirable to attempt a replication of this study, using normative data which are applicable to the experimental population.

The second part of the present study examined the effect of verbal repetition on the association value of ten words. After the repetition procedures it was expected that the association value of a word will decrease; it was also expected that visual stimulation without overt repetition of a word will affect the association value in the same way.

The first association to a word that is made after the word has been repeated aloud for a certain period was expected to be uncommon, compared to the first association made to a word without repetition. Again visual stimulation only without repetition of the word was expected to produce the same effect as the experimental treatment of overt repetition. Commonness and uncommonness of the first associations to the experimental words were defined in terms of normative data gathered from the experimental population prior to the experiment.

CHAPTER II

EXPERIMENTAL DESIGN

Experiment I

The experimental procedure for producing semantic changes in a word is rapid oral repetition of that word, typically for 15 seconds. This involves a time interval which is filled in two ways, a) by overt verbalising of the word and b) by looking at or possibly by rehearsing a word. Thus there are three factors which may enter into the production of changes of meaning, when meaning is measured by ratings on semantic scales. These are a) overt verbalisation, b) fixation and rehearsal and c) the time interval between seeing a word and rating that word.

Schulz et al. (1965) provided control for verbalising by comparing a group that repeated a word aloud for 15 seconds with a group that waited for 15 seconds before making it's ratings. Smith and Raynor (1956) have suggested that in this procedure, visual stimulation is in itself satiating and it would seem necessary to provide a control for this. Lambert and Jakobovits (1960) introduced an irrelevant word control in which the subject repeated aloud an irrelevant word before rating the relevant word. This control was included in order to determine what effect the act of repeating words had upon the stability of ratings. This control

is a filled interval control, whereas the previous condition is an empty interval control.

In these three groups, the procedures embody an interval of time between the subject first seeing a word and his making a rating of that word. Control for this is introduced by a no treatment group of subjects who wait for 15 seconds between the rating on a semantic scale and the presentation of the next word.

In the present study there are then four groups of subjects: 1) the experimental group (R) who repeat a word for 15 seconds and then rate the word on a semantic scale, 2) the silence control group (F) who pronounce a word once and rate it on a semantic scale after 15 seconds, 3) the irrelevant word control group (IR) who pronounce a relevant word, repeat an irrelevant word for 15 seconds; then rate the relevant word on a semantic scale and 4) the control group (C) who pronounce and rate the relevant word on a semantic scale, waiting 15 seconds between the ratings. With these controls all the subjects are involved in the post treatment situation for the same length of time and comparisons between the groups become legitimate.

To assess the effects of taking a pretest on the post treatment rating of words, each of these groups were subdivided into two equal subgroups. One subgroup in each treatment condition was given the pretest and the other subgroup

received only the treatment and the post treatment rating. The design for this experiment (1) is schematised in figure 3.

A comparison of the post treatment mean ratings of the subgroups subscripted 1. with those of the subgroups subscripted 2. demonstrates the effect of taking a pretest on the post treatment ratings of the words. Subgroups C_2 take only the pretest once and comparisons of the mean of this subgroup with the mean of the ratings of three pretested treatment subgroups may be used as polarity difference scores. Lambert and Jakobovits (1960) used within subjects polarity difference scores, taking the mean polarity rating of the pretest from the mean polarity rating of the post treatment ratings and found a statistically significant difference between the two means only of their experimental groups which corresponds to subgroup R_1 in the present study.

Comparing the post treatment mean ratings of group R with those of group F establishes the effect of the overt verbal repetition of a word before rating the same word. It is assumed that if the oral repetition of a word is satiating, the mean of the group R ratings should be lower than that of group F, when mean polarity scores are used in the comparison.

Contrasting the post treatment mean ratings of group F with those of group C is presumed to reflect the effect of

Group	Subgroup	Time 1	Time 2
R	R ₁	see, rate, wait 15 secs.	repeat word 15 secs, rate
	R ₂	-	as above
F	F ₁	see, rate, wait 15 secs.	pronounce; wait 15 secs, rate.
	F ₂	-	as above
IR	IR ₁	see, rate, wait 15 secs.	pronounce relevant word, repeat irrel- evant word for 15 secs. rate relevant word.
	IR ₂	-	as above.
C	C ₁	see, rate, wait 15 secs.	see, rate, wait 15 secs.
	C ₂	-	as above.

Figure 3: A schematic representation of the design of experiment 1.

the visual stimulation of a word on the semantic ratings of the word. Lambert and Jakobovits (1960) found the polarity difference score for their silence control group (corresponding to subgroup F_1 in this study), was not reliably different from zero. This comparison indicated above is introduced in order to test the hypothesis that visual stimulation does influence dependably the post treatment ratings of the words on semantic scales.

The difference between the mean post treatment rating of the subjects in group R and that of the subjects in group IR is assumed to mirror the consequents of the repetition of a specific word before rating it on semantic scales. It is supposed that if the verbal repetition of a specific word is satiating for that word, the mean of the group R ratings should be lower than that of group IR, when mean polarity scores are employed in the comparison.

A comparison of the mean post treatment ratings of group IR with those of group C is assumed to reflect the combined effect of the repetition and exposure to any word before rating a specific word on semantic scales. This treatment is presumed not to be satiating and no differences between the means of the two groups is expected.

Method

Subjects. The population from which one hundred and twenty volunteers were recruited to serve in this experiment,

was the Psychology 100 class and included full time students from the winter session and evening students from the summer session. This population was homogeneous in its naïveté concerning the methods of psychological experimentation, but in little else. The range in age was from sixteen to over 50, and the occupations of the subjects varied from full time undergraduate student through school teacher and technical instructor to postmaster and housewife. None of these 120 subjects served in experiment 11, which was run concurrently. Experiment 11, described in detail below, involved the same experimental words and similar treatments, but a different response measure and it was felt that participation in experiment 11 would bias the results of experiment 1 and vice versa. These subjects were assigned to eight equal groups on a random basis.

Materials and Apparatus. The materials used were the five words studied by Lambert and Jakobovits (1960) and Yelen and Schulz (Expt. 4, 1963), "rich, me, family, child and truth". All these words appeared to be loaded on the evaluative dimension of semantic space and therefore, the results of any operations performed on their meaning could not necessarily be applied to words that are loaded on either of the other two major dimensions of semantic space. Five other words, "green, jelly, sweet, tartan and typhoon" were chosen arbitrarily from among words scaled by Noble

(1952) and Kent and Rosanoff (1910) and were included in the study.

The semantic scales employed were those used by Yelen and Schulz (Expt. 4, 1963) and by Schulz et al. (1965), "good/bad, active/passive and beautiful/ugly" which their analysis (1963) designated as satiation scales, and "wide/narrow, fast/slow and large/small" which were characterised as generation scales.

Each of the ten words was printed in black upper case type script, centered one inch from the upper edge of a 3 x 5 inch white card. The six scales were printed in black upper case type on separate 3 x 5 inch white cards, with the midpoint of the scale centered one inch from the lower edge of the card. The intervals of the scales were labelled from 1 through 7, for ease of recognising and recording the subject's responses, as Yelen and Schulz (1963) found that the effect of labelling the semantic scales was minimal. The words and scales were then arranged in a predetermined order which maximised the separation of the individual words and scales. Five different orders of presentation were prepared. The stimulus material was presented to the subjects manually by the experimenter, each subject taking one of the five orders of presentation in the pretesting phase and another order of presentation in the post treatment phase.

Procedures. The subjects in the pretested subgroups

(R_1 , F_1 , IR_1 and C_1) were given the list of words and rated them on the scales. There was a 15 second interval between ratings so that the subject saw a word, pronounced it once, was presented with a scale, and then rated the word pointing to a position on the scale. The subject then waited for 15 seconds before being presented with the next word.

The experimental procedure for group C was the same as that of the pretest for the groups just described, such that the subjects in subgroup C_1 performed the pretest once and then a second time, using a different order of words and scales.

The experimental procedure of group R was repetition of a word aloud for 15 seconds followed immediately by rating the word on a scale. There was no interval between the rating of one word and the presentation of the next.

The experimental treatment of group F involved the presentation of a word, which the subject pronounced once, then waited for 15 seconds, after which a scale was shown and the subject rated the word on it. The next word followed without an interval. There were no instructions to fixate or think about the stimulus word during the waiting period.

The subjects in group IR were shown a word and instructed to pronounce it once, and then an irrelevant word (a word which was not ever, subsequently, rated) was presented. The subject repeated this second word aloud for 15 seconds.

The relevant word was then shown again, pronounced and rated on a scale. Again there was no interval between the rating of one word and the presentation of the next word.

Professor Schulz kindly made available his 1965 instructions to his subjects, which were used for subgroups R_2 and F_2 in this study. Instructions for the remaining subgroups were modified from these and are presented in appendix 1.

Experiment II

In this study, the effects of overt repetition of a word on its subsequent association value and the nature of the first associations to a word are examined. Overt verbal repetition of a word is assumed to be satiating and it is suggested that visual exposure to a word for a prolonged length of time also leads to a diminution of the connotative meaning of a word. By the above mentioned measures of the meaning of a word, oral repetition of a word was expected to result in smaller association values and an increase in the uncommonness of the first associations to a word.

As indicated earlier, it is essential that the normative data of the first associations to a word be relevant to the population from which the experimental sample is to be drawn. Accordingly, some months prior to the experiment, normative data for the first associations to a word and for the association value of twenty words were collected. The

procedure used was based on Noble's (1952), but with some modifications. Noble's instructions included advice to the subject to repeat the word to be associated to subvocally while he is writing his associations. It was felt that this instruction was similar to the instructions of the experimental procedures for producing satiation and was therefore undesirable. Some emphasis was placed on the subject's referring back to the stimulus word, but instructions to subvocalise it were not included, nor was the stimulus word reprinted on each line of the booklets used.

From these data, tables of the subjects first associations to twenty words were prepared; the association values of these words were also computed. The twenty words included the ten words to be used subsequently in the experiment proper. These tables of the first associations to the experimental words were used for comparison purposes instead of Kent Rosanoff (1910) tables as the latter were compiled from data collected from a population that was not equivalent to the one sampled in the present study.

Smith and Raynor (1956) recommended that a response be called common if it occurred 35 times or more per 1,000 subjects, while Jenkins and Palermo (1964) called a response that occurred 10 times per 1,000 subjects popular and any response that was given less frequently they called idiosyncratic. As the level of this ratio is a vital one in

determining the result of the present study, a compromise level was arbitrarily decided upon, and any response which occurred five times or more in the normative data tables was called common and a response that was given four times or less was called uncommon (N 217).

This experiment involved three groups and all of the subjects in these groups theoretically had been pretested by virtue of the collection of the normative data. The experimental group (A) repeated a word aloud for 15 seconds and then wrote associations to the same word for one minute. This procedure was assumed to be satiating and should result in decreased association values to the repeated word and an increase in the frequency of uncommon associations to the word. The control group B, which saw the word waited for 15 seconds in silence before writing associations to the exposed word, was introduced to isolate the effects of the overt repetition of a specific word on the response measures. A no treatment group (C) was included for the purpose of comparison with group B to reflect the effect of visual exposure to a word on the response measures. The assumption that visual exposure in itself changes the meaning of a word can be tested by this comparison and it was expected that the association values of words will be decreased under the procedures of group B as compared with the association values of words produced under the no treatment conditions of group C.

The procedures of group A, which are assumed to be satiating and to result in a loss of the availability of the common associations to a word were expected to produce first associations to the experimental words that are less common than those given under the procedures of group B, if overt repetition of a word is the factor that occasions the change in meaning. The effect of the visual stimulation by itself on the commonness of the first associations to a word is reflected in the comparison between the associations given under the conditions of group B with those emitted under the no treatment conditions of group C. The associations of the subjects in group B were expected to be less common than those of the subjects in group C. The design for this study (experiment 11) is schematised in figure 4.

Method

Normative data. Preparation for this experiment involved the gathering of association norms for twenty words. The winter class of 217 Psychology 100 students was used as the subject sample. Booklets with one word printed at the top of each of twenty pages, were distributed to the students at the beginning of one normal class session, early in the academic year. The students were allowed one minute to write associations to each word. The instructions which were given to the class are presented in appendix 11. The first association made to each word was tabulated and the frequency

	Group A	Group B	Group C
	see	see	-
Phase I	repeat for 15 sec.	wait for 15 sec.	see
Phase II	associate for 60 sec.	associate for 60 sec.	associate for 60 sec.

Figure 4. A schematic representation of the design of experiment 11.

charts of these are presented in appendix IV.

Subjects. For the experiment proper, fifty-four volunteer subjects from the Psychology class used for the collection of the normative data were divided randomly into three groups. None of these subjects had served in experiment 1, which is described above. Half the subjects were tested by a colleague and the remainder by the author.

Materials. Each of the ten experimental words was printed in black upper case typescript on a 3 x 5 inch white card and centered one inch from the top edge of the card. The stimulus material was presented manually to the individual subjects and comprised one of five random orders of presentation of ten words.

Procedures. Group A was instructed to repeat the presented word as fast as possible until the experimenter said "now". The interval during which repetition occurred was 15 seconds. Immediately following this, each subject wrote associations to the same word for one minute. At the end of one minute the experimenter presented the next word without delay.

Group B was presented with a word and instructed to wait until the experimenter said "now". This silent interval was 15 seconds in duration. The subject then wrote associations to the same word for one minute. There was no time interval between the end of one presentation and the start

of the next.

The instructions to group C were similar to those used in the collection of the normative data.

All the subjects in these groups used booklets of plain paper and they turned to a fresh page of their booklets for each word. They all had a practice session consisting of one word, "window". The instructions for these three groups are presented in appendix III.

CHAPTER III

RESULTS

Experiment 1

Subjects in this experiment rated ten words on each of six seven-point semantic scales, which resulted in 60 direct scores ranging from one to seven for each subject. The distribution of the direct scores is dependent on the positioning of the polar adjectives at either end of the scale. Thus, the word "truth" might be rated at position 6 on the scale "fast/slow", but would be rated at position 2 on the scale "slow/fast". Positions 6 and 2 however, regardless of the direction of the scale, represent equivalent degrees of polarity or intensity of meaning in one dimension. Each scale has three degrees of polarity, with the position labelled "4" having a polarity score of zero, and indicating a lack of applicability of the word to either of the polar adjectives. Lambert and Jakobovits (1960, etc.) have used mean polarity scores in their measurement of semantic satiation and these investigators have objected to the use of mean direct ratings.

The raw data of this study, which consisted of direct scores, were transformed to polarity scores in the following manner: $X - 4 = |p|$, where X represents the direct score. The mean polarity score for each subject's post treatment

ratings was computed, with a possible range of zero to three. High scores indicate a greater polarity or intensity of meaning, and a mean polarity score of zero would represent a complete lack of applicability of any word to any scale.

The results of experiment 1 are presented in figure 5, which shows the overall mean post treatment polarity scores for the four pretested subgroups and the four non pretested subgroups. The graph shows that the groups that had not been pretested have higher mean polarity scores than do those groups that had been pretested. Both subgroups C have lower polarity scores than do any of the treatment subgroups, though the mean polarity score of subgroup C_2 is close to the mean polarity scores of the pretested treatment subgroups (R_1 , F_1 and IR_1).

The summary of the analysis of variance presented in table I shows the partitioning of the total variance into that due to the treatment effects, that due to the testing condition effects, that due to the interaction of the main effects and a residual variance. Four treatment variables, repetition (R), silence (F), irrelevant word repetition (IR) and a no treatment control (C), under two testing conditions, with and without pretesting, resulted in a 2×4 factorial design with all comparisons being between subjects. No reliable differences between the treatments effects was found. An F ratio of 7.00 ($p < 0.01$) reflected differences between

FIGURE 5. Overall mean post treatment polarity scores for the 8 subgroups of Experiment I (R=repetition, F=exposure, IR=irrelevant word, C=no treatment)

TABLE I

The Summary Table of the Analysis of Variance
Performed on the Overall Mean Polarity Scores

Source	df	SS	MS	F
Pretested vs. Non pretested (P)	1	1.19	1.19	7.00
Treatments (T)	3	0.98	0.33	n.s.
P x T	3	0.16	0.05	n.s.
residual	112	19.34	0.17	
Total	119			

$p < 0.01$

the testing conditions. There was no statistically significant interaction between the treatment effects and the testing conditions.

A consideration of the procedures of the experimental and control groups suggested that polarity or intensity of the connotative meaning of a word was dependent in part on the length of time a subject spent in the experimental situation. Figure 6 presents the mean polarity scores of the first half of the post treatment ratings and of the second half of the post treatment ratings for each subgroup. For the pretested subgroups, the first half of the test appears to result in higher polarity ratings than the second half, with the exception of subgroup IR_1 . Among the non pretested subgroups R_2 and C_2 seem to follow this pattern of higher mean polarity ratings in the first half of the test, but the subgroups IR_2 and F_2 are similar to IR_1 , with higher mean polarity ratings in the second half of the test.

An analysis of variance to include the effect of splitting the post treatment ratings was performed and resulted in a three dimensional design with the halves of the testing as a within subjects effect and the main effects of treatments and the testing conditions as between subjects comparisons. A summary table of the sources of variance is presented (table II). The F ratio test showed that there were differences between the treatment means which

FIGURE 6. Mean polarity scores of the first half and the second half of the post treatment ratings for the 8 subgroups of Experiment I

TABLE II

The Summary Table of the Analysis of Variance Performed to Include the First Half and Second Half of Testing Effect

Source	df	SS	MS	F
Between Ss	119	24.13		
Treatments (T)	3	1.82	0.61	3.59*
Pretest (P)	1	2.53	2.53	14.88**
T x P	3	0.21	0.07	<1.00
res _(b)	112	19.57	0.17	
Within Ss	120	25.95		
Halves (A)	1	0.14	0.14	<1.00
A x T	3	0.49	0.16	<1.00
A x P	1	0.00		
A x T x P	3	0.41	0.14	<1.00
res _(w)	112	24.91	0.22	
Total	239	50.08		

*p < 0.05
 **p < 0.001

were reliable at the 0.05 level, and that the difference between the means of the pretested subgroups and the non pretested subgroups was dependable at the 0.001 level. There was no significant difference between the means of the first half of the test compared with those of the second half of the test. There were no dependable interaction effects.

In order to evaluate the main effects of the individual treatments, t-tests were performed for those comparisons that were conceptually valid, using the differences between the treatment means and an error term based on the between subjects residual mean square of table II, with 112 degrees of freedom.

The comparison of treatment R with treatment F was assumed to isolate the effect of overt verbal repetition of the rated word, since visual exposure time to the to-be-rated word was kept constant for these two groups. No reliable differences between the means of these two treatment groups was found ($t \leq 1.00$).

The comparison of treatment R with treatment IR was undertaken to pinpoint the effect of the specific repetition and exposure to the rated words. Again no reliable difference between the treatment group means was found ($t \leq 1.00$).

The comparison of treatment F with treatment C was presumed to separate the effect of exposure to a rated word. The difference between the means was found to be reliable

at the 0.01 level ($t = 2.24$, $df = 112$).

The comparison between treatment IR and treatment C was performed to isolate the effect of repeating any word before rating a specific word. A $t = 3.08$ ($df = 112$) indicated that the difference between the treatment means was dependable at the 0.005 level.

A further comparison suggested by the graph shown in figure 6 was made using a t-test for independent groups. The means of the control subgroups C_1 and C_2 seemed to be lower than those of the treatment subgroups, which could reflect the effect of an interval of time between the subject's first seeing the to-be-rated word and rating it. The mean of the three treatment group means ($\overline{R + F + IR}$) was compared with the control group mean ($\overline{C}$) and the difference found to be statistically significant ($t = 3.18$, $df = 112$, $p < 0.001$).

Experiment 11

Experiment 11 provided data on two measures of meaning for ten words. These measures were a) the association value of a word and b) the frequency of common and uncommon associations to a word. Each of these measures was compared under the three conditions of repetition and exposure (A), exposure alone (B), and a no treatment control (C). A further comparison of the treatment effects was made possible

by comparing the mean number of different first associations made to the ten words by the subjects in each of the three conditions.

Figures 7a and 7b show the mean number of associations to each word, made under each of the three conditions. Each point on the graphs represents the mean number of associations to the specified word made by a group of 18 subjects, in 60 seconds. The data are presented in two graphs only to facilitate inspection. The graphs show that the subjects in the repetition and exposure alone conditions (A and B) seemed to make more associations to the words than did the subjects in the control condition (C), and that there was a tendency for the subjects in condition A to make fewer associations to six of the ten words than did the subjects under condition B.

These data were analysed in the manner suggested by Lindquist (1953) for a type 1 design with words as a within subjects factor and experimental treatment conditions as a between subjects factor. The analysis of variance showed that differences between the treatment group means were significant at the 0.05 level ($F = 4.30$, $df = 2$ and 51) and that the F ratio associated with the differences between words was reliably greater than one ($F = 9.24$, $df = 9$ and 459 , $p < 0.01$). The summary table of the sources of variance for this analysis is presented in table III.

FIGURE 7a. Mean number of associations made to 5 words under conditions of repetition (A), exposure only (B), and no treatment (C)

FIGURE 7b. Mean number of associations made to 5 words under conditions of repetition (A), exposure only (B), and no treatment (C)

TABLE III

The Summary Table of the Analysis of Variance Performed
On the Mean Number of Associations to Ten Words

Source	df	SS	MS	F
Between Ss	53	2,212.02		
Conditions (C)	2	319.07	159.53	4.30*
res _(b)	51	1,892.95	37.11	
Within Ss	486	2,051.20		
Words (W)	9	301.10	33.45	9.24**
W x C	18	86.60	4.81	n.s.
res _(w)	459	1,663.50	3.62	
Total	539	4,263.22		

*p < 0.05

**p < 0.01

Figure 8 shows the mean association of all words pooled for each of the three treatment groups. Individual comparisons of these means were undertaken with t-tests employing an error term based on the residual mean square between subjects of table III.

The individual comparison of the means of the groups A and B was presumed to reflect the effect of the overt repetition of a word before making associations to it, as the visual exposure was kept constant for these two groups. A difference that was reliable at the 0.05 level was found to obtain ($t = 1.72$, $df = 51$).

The comparison between the means of groups A and C was assumed to identify the combined effects of verbal repetition and visual exposure to a word before making associations to the same word. The difference between the two means was found to be statistically significant ($t = 2.47$, $df = 51$, $p < 0.01$).

The comparison of the means of the treatment groups B and C was undertaken to isolate the effect of exposure alone to a word before making associations to it. A difference reliable at the 0.005 level was found ($t = 2.64$, $df = 51$).

In summary the results of the analysis of the individual differences between the treatment group means, using t-tests (one-tailed), showed that the mean association

value of group B was reliably greater than the mean association value of group A, which was significantly larger than the corresponding mean of group C.

Table IV presents the normative association values for the ten experimental words, prepared from data gathered prior to the commencement of the present study. For the purpose of comparison the association values obtained under the three experimental treatment conditions and the overall mean association values for the ten words are included.

To estimate whether the repetition procedures had an effect on the commonness of the first associations made to a word, comparisons of the frequency of common and uncommon associations were made, using the chi square statistic. Commonness of association was defined by each word in terms of the normative data, gathered by Campbell and Corbet, which is presented in appendix IV. Any word that was given five times or more as a first association was called common and any word given four times or less was called uncommon. For example, "tornado" was given as a first association to "typhoon" six times by the subjects participating in the collection of the normative data and would be scored as common. "Carpetbaggers" was given by only one subject under the same conditions and would be scored as uncommon. The observed values in the ten 3×2 chi square expectancy tables (one per word) were filled by counting the kind

FIGURE 8. Mean number of associations made to 10 words under conditions of repetition (A), exposure only (B), and no treatment (C)

TABLE IV

The Association Value of Ten Words (Normative Data, N=217),
And the Association Values Obtained Under Three Experimental
Conditions (n=18) and the Overall Mean Association Values
(N=54)

Word	N.D.	Condition			Overall
		A	B	C	
child	7.65	11.56	10.50	9.28	10.44
family	8.85	10.50	10.00	8.28	9.59
green	8.36	9.50	10.33	8.44	9.43
jelly	7.52	9.49	10.05	8.28	9.26
me	6.33	8.67	9.44	7.33	8.48
rich	7.60	10.22	10.50	8.22	9.65
sweet	7.05	9.05	8.39	7.50	8.31
tartan	7.02	10.44	9.67	7.33	9.15
truth	6.29	8.00	9.28	7.78	8.35
typhoon	8.34	10.66	11.00	9.89	10.52

(common or uncommon) of association (rows) under each of the three conditions (columns) of Experiment II. It was found that for only two of the ten experimental words did the treatments A and B and C produce significantly different kinds of associations. These words were "sweet" ($\chi^2=5.3$, $df=2$, $p<0.1$) and "me" ($\chi^2=6.07$, $df=2$, $p<0.05$). For both of these words the differences in the frequency of commonness of the first associations was in the hypothesised direction; that is, more uncommon first associations than would have occurred by chance alone (calculated expectancy), occurred under the conditions A and B, and fewer uncommon first associations than would be expected, were observed in the control condition C. The χ^2 calculated for "typhoon" approached significance, with the differences between the observed and the expected frequencies in the postulated direction ($\chi^2=3.49$, $df=2$).

A further test of the effect of visual exposure on the nature of the first associations made to a word was accomplished by pooling the data of the two experimental groups (A and B) and comparing the frequencies of the kind of associations (common or uncommon) taken together, with the associations of the control group (C). Table V presents the resulting expectancy table for which χ^2 was 7.31, $df=1$, $p<0.01$.

For each of the experimental groups, the first association to each word was recorded and these data are presented

TABLE V

The Expectancy Table of Common and Uncommon Associations
Using Pooled Data from the Two Exposure Groups (A and B)

Associations	Groups		
	A and B	C	
Common	211	127	observed
	225	113	expected
Uncommon	149	53	observed
	135	67	expected

$$\chi^2 = 7.31, df = 1, p < 0.01$$

in appendix VI. Mean numbers of different first associations (disregarding the criteria common or uncommon) were calculated for each group and compared using t-tests, with an error term based on the relevant group variances. The difference between the mean number of different first associations of group A (repetition) and the corresponding mean of group B (exposure only), which reflects the effect of 15 seconds repetition was not statistically significant. A dependable difference, however, was found to obtain between the means of numbers of different first associations for group B ($\bar{X} = 11.7$) and group C ($\bar{X} = 9.1$) which was assumed to mirror the effect of visual exposure to the stimulus words ($t = 2.95$, $df = 18$, $p < 0.005$).

CHAPTER IV

DISCUSSION

Experiment 1

This discussion is limited to the results obtained by the analysis of the polarity scores only, as these scores can be said to represent a single dimension of meaning, viz., intensity, which is common to all the scales employed.

In attempting to interpret these scores, it is important to consider precisely what the subject has done under the various conditions and treatments. Each mean score that has entered into the analysis is summarised information derived from sixty ratings of words on semantic differential scales and represents approximately 20 minutes of each subject's time. Subjects in those subgroups that were pretested also spent 20 minutes making the same ratings before they produced the scores that entered into the analysis. An examination of figure 6 shows the mean scores for the non pretested subgroups to be higher than those of the pretested subgroups and a suggestion that the mean scores for the second half of the testing period were lower than those of the first half. The analysis of variance which was applied to these data (table II) showed the differences between the means of the pretested and the non pretested groups to be dependable, though the differences between the means for different halves

was not statistically significant. These results imply that words have a greater intensity of meaning for those subjects who were not pretested than for the subjects of the pretested subgroups and suggest that intensity of meaning, as measured on the semantic differential is in some way related to the number of ratings of words that the subject has made. The reliable difference between the pretested and the non pretested subgroup means provides confirmation for the assertion of Campbell (1957) who writes of the effect of taking a pretest on the dependent variable. This difference also tends to confirm Schulz' (1965) argument of a regression-like phenomenon associated with the taking of a pretest. The difference between the means of subgroup C_1 ($\bar{X} = 1.28$) and subgroup C_2 ($\bar{X} = 1.48$) was significant at the 0.01 level ($t = 2.34$, $df = 112$). As the only procedural difference between these two subgroups was the taking of the pretest (subgroup C_1), it must be concluded that the taking of the pretest lowers the intensity of meaning of words as measured on the semantic differential.

An analysis of the total variance of the data of the non pretested subgroups was performed as an expanded replication of the study of Schulz et al. (1965), and a summary table of the sources of variance is presented (table VI). The results of the analysis revealed no dependable differences between the treatment group means, supporting the results of

TABLE VI

The Summary Table of the Analysis of Variance Performed on
The Data of the Non Pretested Subgroups R_2 , F_2 , IR_2 , and C_2

Source	df	SS	MS	F
Treatments (A)	3	0.63	0.21	1.17 n.s.
Within Subjects (res)	56	10.19	0.18	
Total	59	10.82		

Schulz et al. when the posttest only design was employed.

Lambert and Jakobovits recommended that measurement of the semantic change associated with the repetition of a word should be accomplished by taking differences between pre- and post treatment polarity scores. When they did this, they found their measure of semantic change to be reliable and to reflect the differences between the treatment groups. The subgroups suffixed (1) in the present study are a replication of Lambert and Jakobovits (1960) groups and the subgroup C_2 can be said to represent the pretest measures for all subgroups. A table of means and variances for the eight subgroups is presented (table VII) and inspection of the table showed no difference between the mean of subgroup C_2 and the means of the post treatment scores of the pretested subgroups (R_1 , F_1 and IR_1). It could be argued that the within subjects measure of difference of Lambert and Jakobovits is a more reliable indication of the change of meaning after a treatment than between subjects comparisons. In the present study the statistically significant difference between the means of the pretested groups and the non pretested groups demonstrated the effect of taking a pretest on the post treatment scores. This finding casts doubt on the conceptual significance of the difference scores advocated by Lambert and Jakobovits, as measures of the changes in intensity of meaning of words, if one wishes to eliminate

TABLE VII

The Means and Variances for the Eight Subgroups of Experiment 1
(n = 15)

Subgroup	Pretested		Subgroup	Non Pretested	
	Mean	Variance		Mean	Variance
R ₁	1.47	0.23	R ₂	1.57	0.17
F ₁	1.43	0.15	F ₂	1.64	0.11
IR ₁	1.46	0.24	IR ₂	1.73	0.23
C ₁	1.23	0.17	C ₂	1.48	0.20

The critical difference between the individual means presented above is 0.24 (df = 112, $p < 0.01$ one-tailed) using an error term based on the residual mean square for between subjects of table II.

from such changes the regression-like phenomenon postulated by Yelen and Schulz (1963).

Since the analysis of variance performed on the data of this experiment disclosed no significant interaction effects between the conditions of pretesting and the treatments effects, the consequents of the different treatment procedures on the response measures may be examined by analysis of the combined data of the treatment groups (R, F, IR and C). The results of the individual comparisons performed have been presented above (cf. results section, experiment 1) and are also shown in summary in table VIII.

The results presented in the first two lines of table VIII were interpreted as demonstrating that overt verbalisation of a specific word before rating it on semantic scales had no effect on the intensity of meaning of the word, when intensity of meaning was defined in terms of the degree of polarity of the ratings on the semantic differential.

The results shown in lines 1 and 3 of table VIII were considered together to indicate that the stimulus consisting of a period of visual exposure to a word resulted in changes in the intensity of meaning of a word, but that the additional stimulus of overt repetition of the word during the exposure interval did not affect the intensity of the word's meaning. If satiation of the meaning of a word is considered to be a reduction in the intensity of meaning, operationally

TABLE VIII

A Summary of the Individual Comparisons Made Between the Treatment Group Means of Experiment 1, Using an Error Term Based on the Residual Mean Square of Table II (df = 112)

	Comparison	Effect Tested	Result
1	R > F	overt verbal repetition	t < 1.00
2	R > IR	specific repetition and exposure	t < 1.00
3	F > C	exposure alone	t = 2.42 *
4	IR > C	non specific repetition	t = 3.08 *
5	R + F + IR > C	time interval between seeing and rating a word	t = 3.18 **

* p < 0.01

** p < 0.001

defined as a lowering of the polarity ratings of a word on the semantic differential, the procedures of the treatment groups R and F cannot be judged satiating, since the polarity of the word ratings increased under these treatments, relative to the control group.

The comparison of treatment IR with treatment C was undertaken to reflect the effect of non specific repetition of any word on the semantic ratings of the experimental word. The result of the comparison (line 4, table VIII) revealed that treatment IR elicited significantly higher polarity scores than treatment C. Some of the subjects in the treatment group IR reported that they felt they were rating the combined meanings of the stimulus word and the irrelevant word. If the intensity of meaning of two words can be summated, these comments provided a possible explanation of the reported finding. Apart from the preceding explanation, the result of this comparison was considered to be difficult to interpret, but when it was taken with the result shown in line 5 of table VIII, a possible construction emerged. All the subjects in the treatment groups R, F and IR saw and pronounced a word and then engaged in some activity for an interval of 15 seconds, after which they rated the stimulus word on a semantic scale. The subjects in group C saw and pronounced a word, rating it immediately on a semantic scale. A consideration of these procedural differences led to the conclusion that the increased

intensity of meaning represented by the higher mean polarity scores of the treatment groups R, F and IR compared with the equivalent mean of the control group (C) was dependent simply on the time interval between the presentation of the stimulus word and the production of the rating response, without regard to how this period is filled. A further study, with varying intervals between the presentation of the stimulus and the response rating on the semantic differential should further clarify this interpretation of the present results. One additional group designed to demonstrate the effect of visual exposure of an irrelevant word on the semantic ratings of a word should make the investigation more comprehensive. If the irrelevant word employed was a low meaningful nonsense syllable, any summation of intensity of meaning might be ruled out.

Although reliable differences between the treatment groups of the present study have been demonstrated, the hypothesis that overt verbal repetition of a word reduced the meaning of the word, when meaning is defined in terms of ratings on the semantic differential, has not been supported. However, it is not possible to deny that this reduction of meaning occurs. All the subjects who remained alert enough to be interested in an explanation of the study, said they had experienced the phenomenon of semantic satiation, if they had been in one of the treatment groups that were

required to repeat words aloud. The conclusion which can be drawn is that changes in ratings on semantic scales appear to be an unsatisfactory method of objectifying this subjective change in the meaning of words. It is also possible that the satiation effect is extremely short-lived, despite the indication to the contrary in the results of Lambert and Jakobovits (1960, experiment 2).

Experiment 11

In this study, subjects were required to make associations to ten words under three conditions. Condition A required the subjects to look at a printed word and repeat it aloud for 15 seconds and then to write associations to that word for 60 seconds. Under condition B, subjects looked at a word, waited 15 seconds and then wrote associations to it, again for one minute. In neither of these groups were there specific instructions to fixate the stimulus word. The subjects under condition C wrote associations to the ten words without an interval between the presentation of the stimulus word and the commencement of writing.

Because exposure time to the stimulus word was kept constant for the repetition group (A) and the exposure alone group (B), any differences in the response measure demonstrated should therefore, be due to the effect of the overt verbalisation required by the procedures of group A.

Differences between the response measures of groups B and C were assumed to reflect the effect of exposure to a word before making associations to that word.

As the analysis showed that the mean association value of group A was reliably smaller than the comparable mean value of group B, the hypothesis that overt repetition of a word is related to a reduction of the meaning of the word, as measured by the association value of the word is partially confirmed. However, a comparison of the mean association value of group B (exposure alone) and the corresponding value of group C (control), which was presumed to demonstrate the satiating effect of 15 seconds exposure to a word revealed that the subjects in group B made significantly more associations to the experimental words than did their controls.

A similar comparison between the mean association values of group A (repetition) and group C (control) indicated that the control subjects made dependably fewer associations to the stimulus words than did the subjects who underwent the "satiation" treatment of group A. These results have been displayed pictorially in figure 8.

An examination of the raw data revealed that the control subjects made more chaining associations which by the method of scoring were not counted (Noble, 1952), for example, "red light, yellow light, stop, wait" as associations to

green. One association only was counted for these four responses. Subjects in the exposure conditions (A and B) made associations that were more consistently synonymous with the stimulus word; these differences in the nature of the responses made, contribute to the overall picture, but do not seem to account completely for the differences in the mean association values found.

In contrast to these results Kanungo and Lambert (1963a, experiment 11) found that the rapid repetition of a word before making associations to the repeated word, resulted in a reduction of the association value of the word relative to the association values produced by a no treatment control group of subjects. The discrepancy between the present findings and those of Kanungo and Lambert may be explained by a consideration of the procedural differences of the two studies. Kanungo and Lambert followed Noble's (1952) procedures for the gathering of the association values of words, which included instructing the subjects to repeat the stimulus word subvocally while they were writing associations to it, on pages which had the stimulus word printed on each line. The report of Kanungo and Lambert implied that this method was followed by both the experimental and control groups. The present study deliberately avoided such instructions and continued visual exposure to the stimulus word, as it was thought that the subjects in the control condition

should write associations under the least satiating conditions possible. If satiation of the meaning of a word is defined as a reduction in meaning as measured by the association value of words, the present study has shown that visual exposure alone is not satiating, but could be called generative; if during the period of visual exposure to a word, the subject is also exposed to the stimulus word by repeating it aloud, a relative reduction in the meaning of the word does result and a relative satiation can be said to have occurred. It would seem that the subjects of Kanungo and Lambert were partially satiated in both the experimental and control condition by reason of the methodology employed, and that therefore the additional stimulus presentation of the repetition requirement of the experimental group could have produced a level of stimulus intensity that resulted in a reduction of the meaning of their experimental words. The subjects in the repetition group of the present study were stimulated by the overt repetition of the word as well as by the visual exposure to the word, but they were not instructed to subvocalise the word while writing associations to it, nor did they have the repeated visual exposure during the response period. This level of stimulus intensity was not sufficient to produce satiation of the meaning of the words, relative to the control group.

If meaning is taken to be related to the kind of

association made and is measured on a dimension of frequency of occurrence, the present study showed that the first associations made to a word under satiating conditions are more likely to be uncommon than those made under control conditions (see table V). This finding is comparable to that of Smith and Raynor (1956). However this measure is completely dependent on the level decided upon for the cutting score of common associations and on the normative criterion employed. Smith and Raynor (1956) defined associations with a frequency of 35/1,000 and above as common using as their criteria the norms prepared by Kent and Rosanoff in 1910; the present study defined associations with a frequency of 5/217 and above as common in keeping with the normative data collected from the experimental population. The difference between these cutting scores shows the criterion of the present study to be less stringent than that of the investigation of Smith and Raynor. However, their use of obsolete normative data might tend to prejudice their results in favour of their hypothesis. For example, the first associations to the word "child" in keeping with the present normative data, count as common the associations "love, parents, kid and little", whereas by the Kent Rosanoff norms and the cutting score of Smith and Raynor these words would be scored as uncommon (love 8/1,000, parent(s) 7/1,000, kid 4/1,000 and little 11/1,000).

When the mean number of different first associations for each treatment group was calculated and comparisons between the treatment group means computed, it was found that the differences between the mean number of different words made as first associations in groups A and B was not reliable, though the corresponding difference between the exposure alone group (B) and the control group (C) was statistically dependable, in the direction of a greater variety of associations emitted by the subjects in the exposure group. This was presumed to reflect the effect of visual exposure to a word before making associations to the word. This result is to be expected if meaning is considered to be dependent on a word-word habit and as such subject to the laws of conditioning, which include inhibition of the response with repeated elicitation. If the common association to a word is readily available to a subject, the first time he repeats the word either overtly or subvocally, this common response will be elicited and a refractory phase for this response will then be in effect. With repeated stimulation, the less usual responses will be made refractory in a similar fashion. When the subject is asked to verbalise a response, the common association will not be available and an uncommon response, one that is lower in the hierarchy of possible responses will be given. When meaning is operationally defined in terms of the commonness of the first associations, this concept

of meaning is not contradicted by the data of the present study.

The picture is not so clear when the operational definition of meaning is in terms of the association value of a word. It would seem that continuous visual presentation of a word depresses the meaning of the word as is evidenced by the findings of Kanungo and Lambert (1963a), but that presentation of the stimulus word for a limited period of time enhances it's meaning, as the results of the present study show. A diagrammatic representation of these conclusions is shown in figure 9.

FIGURE 9. A diagrammatic representation of the possible effects of varied levels of stimulus presentation on the association value of words

A = repetition condition
B = exposure alone
C = no treatment control

SUMMARY

This study was designed to demonstrate whether the phenomenon of semantic satiation or loss of meaning of a word with overt repetition, could be measured. Three definitions of meaning were employed a) ratings of a word on semantic differential scales, b) the association value of a word and c) the commonness of the first association to a word. Changes in these measures were assumed to reflect the satiating effect of repeating a word for 15 seconds.

When meaning was defined in terms of ratings of a word on the semantic differential, no effects on the response measure were shown that were specifically due to the satiating treatment. An increase in the intensity of the meaning of words, operationally defined by higher polarity ratings on semantic differential scales, compared with a control was demonstrated as an effect of three treatments. This change in the meaning of words appeared to be conditional on an interval between the presentation of the stimulus and the rating response.

Meaning defined as the association value of a word appeared to be reduced by the overt act of repeating the word, though mere exposure to the word resulted in an increase in it's association value, relative to a control.

The satiation treatment resulted in the production of more uncommon first associations to a word than were given by subjects who had not had any experimental treatment.

Commonness was defined in terms of normative data for the experimental population.

BIBLIOGRAPHY

Amster, Harriet Semantic satiation. Generation? Learning? Adaptation? Psychol. Bull., 1964, 62, 273-286.

Bassette, M. F., and Werne, C. S. On the lapse of verbal meaning with repetition. Amer. J. Psychol., 1919, 30, 415-418.

Campbell, D. T. Factors relevant to the validity of experiments in social settings. Psychol. Bull., 1957, 54, 297-312.

Don, V. J., and Weld, H. P. Lapse of meaning with visual fixation. Amer. J. Psychol., 1924, 35, 446-450.

Fillenbaum, S. Verbal satiation and changes in meaning of related items. J. verb. learning and verb. Behav. 1963, 2, 263-271.

Howes, D., and Osgood, C. E. On the combination of associative probabilities in linguistic contexts. Amer. J. Psychol., 1954, 67, 241-258.

Jakobovits, L. A., and Lambert, W. E. Semantic satiation among bilinguals. J. exp. Psychol., 1961, 62, 576-582.

Jakobovits, L. A., and Lambert, W. E. Semantic satiation in an addition task. Can. J. Psychol., 1962, 16, 112-119.

Jakobovits, L. A., and Lambert, W. E. Mediated satiation in verbal transfer. J. exp. Psychol., 1962, 64, 346-351.

Jakobovits, L. A., and Lambert, W. E. Stimulus characteristics as determinants of semantic changes with repeated presentation. Amer. J. Psychol., 1964, 77, 84-92.

Jenkins, J. J., and Wallace, R. A. An atlas of semantic profiles for 360 words. Amer. J. Psychol., 1958, 71, 688-699.

Jenkins, J. J., and Palermo, D. S. A note on scoring Word Association tests. J. verb. learning and verb. Behav. 1964, 3, 158-160.

Kanungo, R. N., Lambert, W. E., and Mauer, S. M. Semantic satiation and paired associate learning. J. exp. Psychol., 1962, 64, 600-607.

Kanungo, R. N., and Lambert, W. E. Semantic satiation and meaningfulness. Amer. J. Psychol., 1963a, 76, 421-428.

Kanungo, R. N., and Lambert, W. E. Paired associate learning as a function of stimulus and response satiation. Brit. J. Psychol., 1963b, 54, 135-144.

Kanungo, R. N., and Lambert, W. E. Effect of variation in amount of verbal repetition on meaning and paired associate learning. J. verb. learning and verb. Behav., 1964, 3, 359-361.

Lambert, W. E., and Jakobovits, L. A. Verbal satiation and changes in intensity of meaning. J. exp. Psychol., 1960, 60, 376-385.

Lindquist, E. F. Design and analysis of experiments in psychology and education. Boston: Houghton Mifflin, 1953.

Messer, S., Jakobovits, L. A., Kanungo, R. N., and Lambert, W. E. Semantic satiation of words and numbers. Brit. J. Psychol., 1964, 55, 155-163.

Miller, A. Verbal satiation and the role of concurrent activity. J. abnorm. soc. Psychol., 1963, 66, 206-212.

Osgood, C. E., Suci, A. J., and Tannenbaum, P. H. The Measurement of Meaning. Urbana: Univ. Ill. Press, 1957.

Severence, E., and Washburn, M. F. The loss of associative power in words after long fixation. Amer. J. Psychol., 1907, 18, 182-186.

Schulz, R. W., Weaver, A. E., and Radke, R. C. Verbal satiation?? Psychon. Sci., 1965, 2, 43-44.

Smith, D. E. P., and Rayner, A. L. Verbal satiation and personality. J. abnorm. soc. Psychol., 1956, 52, 323-326.

Warren, R. M. Illusory changes in repeated words - differences between young adults and the aged. Amer. J. Psychol., 1961, 74, 506-516.

Yelen, D. R., and Schulz, R. W. Verbal satiation? J. verb. learning and verb. Behav., 1963, 1, 373-377.

APPENDIX I

INSTRUCTIONS TO THE GROUPS OF EXPERIMENT I

Group R

Subgroup R₁ Pretest Repetition Group

These decks of cards contain a series of words followed by rating scales. I will first expose a word and a rating scale. What I want you to do, is pronounce the word as it is exposed and then wait for me to present a rating scale. When I present the scale, you are to rate the word as quickly as possible.

The procedure will go something like this; (give example, window) I'll present a word - window, for example you will pronounce it once as it is exposed and wait for me to present a rating scale similar to this one (present scale, warm/cold). After I have presented the scale, you will rate the word by pointing to one of these 7 positions. (Indicate the 7 positions) The position you point to, will indicate where you think the word belongs on that particular scale. For instance, you would probably rate the word "window" somewhere on the cold end of the scale.

Are there any questions?

Remember, pronounce the word once, wait for me to present a scale, then rate the word as quickly as you can by pointing to one of the 7 positions.

(Administer Pretest)

Now, this time through, I want you to repeat the word aloud and keep repeating the word as fast as you can until I present a rating scale; when I present the scale, you are to rate the word as quickly as possible.

(Practice session with "window", scale "warm/cold")

Subgroup R₂ No Pretest Repetition Group

These decks of card contain a series of words followed by rating scales. I will first expose a word and then a rating scale. What I want you to do is, when I expose a word, to repeat the word aloud and keep repeating the word as fast as you can until I present a rating scale. When I present the scale, you are to rate the word as quickly as possible.

The procedures will go something like this. I will present a word, window, for example, you will repeat it aloud as fast as you can until a rating scale similar to this one is exposed (present scale, warm/cold). When the scale is exposed, you will rate the word as quickly as possible by pointing to one of these 7 positions (indicate 7 positions) The position you point to will indicate where you think the word belongs on the particular scale. For instance you would probably rate the word "window" somewhere at the cold end of the scale.

Are there any questions?

Remember, repeat the word aloud as fast as you can until the scale is exposed, then rate the word as quickly as you can, by pointing to one of the 7 positions.

Group F

Subgroup F₁ Pretest Silence Control

These decks of cards contain a series of words followed by rating scales. I will first expose a word and then a rating scale. What I want you to do, is pronounce the word once as it is exposed and then wait for me to present a word as quickly as possible.

The procedure will go something like this. (Give example window) I'll present a word, window for example, you will pronounce it once, and wait for me to present a rating scale similar to this one (present scale, warm/cold). After I have presented the scale, you will rate the word by pointing to one of these 7 positions. (Indicate the 7 positions). The position you point to will indicate where you think the word belongs on the particular scale. For instance, you would probably rate the word "window" somewhere on the cold end of the scale.

Are there any questions?

(Administer Pretest).

Now this time I want you to pronounce the word once and wait until I present the scale. Remember when I present

the scale you are to rate the word as quickly as you can.

(Practice session with "window" scale "warm/cold").

Subgroup F₂ No Pretest Silence Control

These decks of cards contain a series of words followed by rating scales. I will first expose a word, and then a rating scale. What I want you to do, is to pronounce the word once and then wait for me to present a rating scale. When I present a scale, you are to rate the word as quickly as possible.

The procedure will go something like this. I'll present a word (give example, window) window for example, you will pronounce it once and wait for me to present a rating scale similar to this one. (Present scale, warm/cold). After I have presented the scale, you will rate the word by pointing to one of the 7 positions (indicate the 7 positions). The position you point to will indicate where you think the word belongs on the particular scale. For instance, you would probably rate the word "window" somewhere on the cold end of the scale.

Are there any questions?

Remember, pronounce the word once, wait for me to present a scale, then rate the word as quickly as you can by pointing to one of the 7 positions.

Group IR

Subgroup IR₁ Pretest Irrelevant Word Control

These decks of cards contain a series of words followed by rating scales. I will first expose a word and then a rating scale. What I want you to do is pronounce the word as it is exposed and then to wait for me to present a rating scale. When I present the scale, you are to rate the word as quickly as possible.

The procedure will go something like this. (Give example window). I'll present a word - window for example, you will pronounce it once and wait for me to present a rating scale similar to this one (Present scale, warm/cold). After I have presented the scale, you will rate the word by pointing to one of these 7 positions (indicate the 7 positions). The position you point to, will indicate where you think the word belongs on the particular scale. For instance, you would probably rate the word "window" somewhere on the cold end of the scale.

Are there any questions?

Remember, pronounce the word once, wait for me to present a scale then rate the word as quickly as you can, by pointing to one of the 7 positions.

Pretest.

Now, this time through, I want you to pronounce the word you see first, then I will present another word, which

you are to pronounce and keep repeating aloud as fast as you can, until the first word is presented again. Pronounce it once. Then, when the scale is presented, rate the word you have just seen as quickly as you can.

(Practice session with "window" "night" scale "warm/cold").

Subgroup IR₂ No Pretest Irrelevant Word Control

These decks of cards contain a series of words followed by rating scales. I will first expose a word which you will pronounce once. Then I will present another word which you are to repeat aloud as fast as you can until I present the first word again. Pronounce it once and then, when I present the rating scale, rate the word you have just seen as quickly as possible.

The procedure will go something like this. I will present a word, window for example (show window). You will pronounce it once. Then I will expose another word (night) which you are to repeat aloud as fast as you can, until the first word is presented again. Pronounce it once and then when the scale is presented (present scale "warm/cold") rate window as quickly as you can be pointing to one of these 7 positions (indicate the 7 positions). The position you point to will indicate where you think the word belongs on the particular scale. For instance, you would probably rate the word "window" somewhere on the cold end of the scale.

Are there any questions?

Remember, say the first word once, repeat aloud the second word as fast as you can until the first word is presented again. Say the first word once then rate it as quickly as you can by pointing to one of the 7 positions.

Group C

Subgroup C₁ Test Retest Control

These decks of cards contain a series of words followed by rating scales. I will first expose a word and then a rating scale. What I want you to do is, pronounce the word as it is exposed and then wait for me to present a rating scale. When I present the scale you are to rate the word as quickly as possible.

The procedure will go something like this. (Give example window). I'll present a word - window for example. You will pronounce it once and wait for me to present a scale similar to this one. (Present scale, warm/cold). After I have presented the scale you will rate the word by pointing to one of the 7 positions, (indicate the 7 positions). The position you point to, will indicate where you think the word belongs on the particular scale. For instance, you would probably rate the word "window" somewhere on the cold end of the scale.

Are there any questions?

Remember, pronounce the word once, wait for me to present a scale, then rate the word as quickly as you can by pointing to one of the 7 positions.

(Administer the Pretest).

Now, we do the whole business again.

Subgroup C₂ Pretest Only Control

The instructions for this group are exactly the same as those of the pretest in all other groups.

APPENDIX II

INSTRUCTIONS FOR THE COLLECTION OF NORMATIVE DATA

This is an experiment to see how many words you can write down in a short time. You will be given a key word, printed at the top of each page of your booklet, and you are to write down as many words as the key word makes you think of.

The words you write down may be places, ideas, things, anything that the key word brings to mind.

For example with the key word KING you could write down throne, ruling, Wizard of ID, man, Queen, England, fisher.

No one is expected to fill all the spaces on a page. Just write down the words AS THEY come to mind. You will be given a certain length of time for each word and will be told when to turn the page.

Be sure to write down the first word as soon as it comes to mind, and to refer back to the key word after writing.

(Allow 5s one minute for each word. Twenty words in all).

APPENDIX III

INSTRUCTIONS TO THE GROUPS OF EXPERIMENT II

Group A Repetition Group

This is an experiment to see how many words you can write down in a short time. You will be shown a key word, which you are to repeat aloud as many times as possible until you are told to start writing. Your signal to stop repeating the key word aloud is when I say "Now". At that point, you will write down as many words as the key word makes you think of. Be quite sure to write down the first think that comes to mind when you stop repeating the key word aloud.

The words you write down may be places, ideas, things, or anything else the key word brings to mind. For example, if you are shown the key word KING you might write down Queen, throne, man, Wizard of ID, England, fisher.

Are there any questions?

Now, here is a word for practice. Remember, as soon as you see the word, repeat it aloud as fast as you can, until I say "Now", then start writing down the words that come to mind. Are you ready to start a practice word? (Show "window" At the end of 15 secs. of repetition, say "Now" and allow S to write associations for 1 minute.)

(Now run the experimental list of 10 words).

Group B Silence Control Group

This is an experiment to see how many words you can write down in a short time. You will be shown a key word which you are to look at until you are told to start writing. Your signal to stop looking at the key word, is when I say "Now". At that point, you will write down as many words as the key word makes you think of. Be quite sure to write down the first thing that comes to mind when you stop looking at the key word.

The words you write down, may be places, ideas, things or anything else the key word brings to mind. For example, if you are shown the key word KING you might write down Queen, throne, man Wizard of ID, England, fisher.

Are there any questions?

Now here is a word for practice. Remember, look at the word until I say "Now", then start writing down the words that come to mind. Are you ready to start a practice word? (Show "window", after 15 secs. say "Now" and allow S to write associations for 1 minute).

Now run the experimental list of 10 words.

Group C Control Group

This is an experiment to see how many words you can write down in a short time. You will be shown a key word and you are to write down as many words as the key word makes

makes you think of. Be quite sure to write down the first thing that comes to mind when you see the key word.

The words you write down may be places, ideas, things or anything that the key word brings to mind. For example, if you are shown the key word KING you might write down Queen, throne, man, wizard of ID, England, fisher.

Now, here is a word for practice. Remember as soon as you see the word, write down the words that come to mind. Are you ready to start a practice word? (Show "window" and allow S to write associations for 1 minute).

Now run the experimental list of 10 words.

APPENDIX IV

NORMATIVE DATA FOR EXPERIMENT II

BITTER

116	sweet	1	ash, bad, better, coffee
31	sour		college professor, cup,
20	lemon		cynic, drinks, Doc. Savage
8	taste		end, evil, flasher, food,
5	angry		gall, gin, Gini, girls, hard
2	acid, tongue		harsh, hate, irony, life,
			me, onions, paper, taut,
			terrible face, unforgiving,
			unpleasant, vinegar.

BODKIN

39	odds	1	animal, arrows, Australian
17	what?		national anthem, baby, bob-
10	sewing		bin, bobby pins, boy, bung-
6	bare		ler, cap, choice, clothing
5	needle, Shakespear		cottage, cover, dopey, Eliz-
4	funny, don't know,		abethan, elf, Europe, exist-
	Hamlet, knife, un-		ance, friend, gad, garment,
	known, weaving		grandmother, grass, Gulliver,
3	name, relative, sled		Ichabod, Irish, jive, king
	sock, sword, unusual		kinship, knitting, latin,
			man, material, meaning, myth-
			ical, napkin, nil, nut, O
			Hell, pin, play, relative
			rogue, Russian, sewing machine
			shirt, spool, stays, street,
			sweater, theatre, thimble,
			tiny, uncle, vodka, wood.

no response 18

CHILD

32	mother	1	adolescent, Barbara, birth
23	small		blond, care, cottage, creat-
20	baby, infant		ivity, cute, dependent, easy
9	love		good, grow, Ken, Kenward, part,
7	parents, young		people, pleasant, Richard,
6	kid		screaming, silk, spoiled,
5	boy, little		talk, tiny, trouble, tot,
4	adult(s), brat,		toys, undeveloped, unbehaved.
	brother, father		

CHILD

4 son
3 children, crying, hood
marriage, mine
2 babysitting, family,
girl, helpless,
innocent, like(able),
man, me, play.

COTTAGE

36 lake
26 summer
22 house
15 cheese
11 home
8 small
7 country
6 fun, swimming, thatched
5 woods
4 beech, white
3 water, vacation
2 boats, fireplace, flower
girls, grass, happiness
seashore, shack, summer
resort, trees

1 Algonquin, aunt, Beech-
ville, camp, Chaumiere,
door, family, farm,
forest, gable, gentle,
hillside, hot, hut,
kids, Meach Lake,
meadows, McKnight, Nor-
way Bay, Old Mother
Hubbard, outhouse,
party, peace, pretty,
relaxation, river, roof,
rose-covered, sea, swiss,
warm, villa.

DARK

88 light
69 night
15 black
7 room
4 fear
2 block, bright, closet,
eyes, negro, white

1 adapt, afraid, alleys,
Alvin, blind, brown,
car, clothes, cold,
colour, forest, girl,
glasses, hair, hard,
horse, illiteracy, lone-
liness, material, mid-
dle, midnight, mind,
party, parking, peace-
ful, photography,
quiet, sex, shadows,
sombre, source, un-
happiness, wow!

FAMILY

47 mother
20 home
16 father
12 friends, love

1 alimony, ancient,
course, community,
close, future one, good,
hate, honeymoon, incest,

FAMILY

11 children	1 kids, kind, kinfolk
10 parents	large, life, mad,
9 brother(s)	many, me, mum, no,
5 people, tree	relatives, relation-
4 mine	ship, sad, small, son,
3 happiness, husband,	strength, supper,
sister, wife	togetherness, unhap-
2 big, car, fights, fun	piness, unity, won-
man, marriage, security	derful.
sociology	

FEMUR

91 bone	1 anatomy, animal, as-
29 leg	tragalus, blankness,
13 what's that?	blood, broken, cat,
12 tibia	child, doctor, feces,
6 female	fertilizer, fire,
3 body, ignorance, thigh	foetus, fur, glob,
2 arm, biology, girl	grasshopper, hot,
	humerus, man, medicine,
	monkey, odd, odour,
	quarter, ribs, scapula,
	skeleton, small, smoke,
	storm, tumor, unknown,
	wall, white.
- no response 12

GREEN

55 grass	1 apples, bell-bottoms,
40 red	clover, Christmas, Cyril,
17 blue	favourite, colour, gables,
13 colour, tree(s),	go, gold, golf, guts,
yellow	hills, Kelly, Mary, MGB,
4 jolly green giant	outdoors, pastures, peas,
leaf, light, white	pure, Robin Hood, sick,
3 dollar, envy, eyes,	sleeves, soft, spectrum,
fields, Irish	spring, summer, vegetables,
2 Christie Minstrels,	verdant.
dress, horn, sweater	

HARD

76 soft	1 bench, boiled eggs, brit-
21 easy	tle, chair, challenge,
16 rock(s), work	cheese, concrete, desk,
7 difficult	durable, durus-a-um, head
5 cold	heart, heavy, hitting,

HARD

4 nails
 3 Day's night, iron
 metal, times
 2 board(s), candy, floor,
 ground, life, math,
 pencil, tough

no response 1

1 knocks, labour, mean,
 money, not easy, on,
 peanut butter, people,
 pillow, resistant, Ron,
 school, self-discipline,
 severe, shot, steel,
 stress, strong, sword,
 task, tedious, tension,
 thick, tired, trouble,
 word.

JELLY

23 jell-o
 22 jam
 19 fish
 11 red
 9 dessert, Santa Claus, roll
 7 apple, beans, belly,
 6 soft
 5 food
 4 flabby, shake, sweet
 3 bowl, doughnut, juggles,
 raspberry, sandwich,
 strawberry, wobbily
 2 bread, gelatin, good
 green, mold, peanut
 butter, shakey, slimey
 slippery, toast

1 bee, bounce, Brenda,
 children, cranberry
 diet, eggs, fat, mint,
 mass, mother, mushy,
 salad, sand, Sherif's,
 shiney, squishy, sticky,
 stone, tart, translu-
 cent, unstable, weak
 work.

ME

64 you
 42 I
 20 myself
 8 girl, person
 4 male
 2 ego, good, handsome
 love, Mary, name,
 small, ugly, young

1 average, big, bright,
 clown, complexity, dead,
 do, exams, fail, fan-
 tastic, fat, fear, friends,
 funny, future, god, great,
 happy, hungry, image,
 individual, John, lazy,
 letter, mine, overworked,
 people, perfect, power,
 procrastination, quiet,
 rich, sad, school, she,
 short, spas, student,
 Sue, Teddy, tired, 24
 ugh, unknown, well-
 dressed, wife, work
 worry, yeah! youth.

MONEY

43 rich(es)	1 appeal, argent, beautiful, bill, books, booze
19 dollars	buck, bureaucracy, capitalism, capitalist,
15 green	cigarettes, currency,
13 wealth	date, desirable, doesn't
7 cash	matter, economic, expensive, fame, family,
6 clothes, power, work	father, finances,
5 bank	greed, greenbacks,
4 car, fun, need, nice	hard to come by, home,
3 dimes, love, necessary quarter	interest, job, leisure,
2 Beatles, coins, gold, happiness, food, none, poor, trouble, wishes yeah!	lender, little, lots, make, material, means, more, 100,000\$, opportunity, penny. pocket, possessions, poverty, problems, save, security, silver, smelly, snobs, spend, success, sun, things to buy, trade tuition, unhappiness, wallet, where.

ORDEAL

37 trial	1 bad, bravery, by water, Carleton, challenge,
18 hard	courage, day, death,
12 fire, trouble	depression, dread,
10 task, torture	energy, event, frustration, girl friend,
9 work	great, gruelling, harsh
8 hardship	horrible, long, massacre, mercy, Middle,
7 difficult(y), exam, pain	Ages, misery, mother,
5 this	order, predicament,
4 life	problem, punish, rigorous, rough, sod,
3 experience, struggle, terrible, tough	strength, strife, success, sweet, test,
2 business, strain tense, tiring, tragedy, trying, university	tired, time, torment, Tuesdays, undergo, undesirable, unpleasant, what kind?, women.

PALLOR

82 pale
20 white
15 colour
14 sick
8 death
6 complexion
5 face, skin
2 don't know, faint,
fear, ghost, grey

no response 17

1 anemic, blank, blush,
cheeks, confusion, couch,
disbelief, droop, face-
less, fever, frightened
frustration, funeral
parlour, ghostly, horse,
illness, lightness,
living room, marsh-
mallows, morgue, nothing
play, red, room, scared,
shy, sombre, stench,
taste, thin, ugh,
undertaker, vocabulary,
wonder, yellow.

QUARTER

57 money
20 half
19 dime
18 football
17 twenty-five cents
12 back
9 moon
7 dollar
4 horse, nickel, silver
3 fourth, section
2 coin, deck, four,
fraction, part, penny
whole

1 apple, butter, cent,
century, change, chicken
clock, first, full,
half-dollar, pie, place
to live, round, stretch
time, turn, Washington,
wish I had one.

RICH

104 poor
40 money
16 wealthy
3 not me
2 car, king, leisure,
opulent, uncle

1 american, aristocrat,
bitch, boy, cadillac,
capitalists, desire,
economy, elite, end,
estate, Europe, futile,
Forest Hill, gold, great,
happiness, help to poor,
home, J. Paul Getty,
large, luxury, man, men,
person, Reid, Riviera,
royal, Scrooge, snob,
some, spoiled.

SWEET

-
92 sour	1 apples, cake, china,
30 sugar	chocolates, drink,
24 candy	Elaine, flowers, gushy,
17 bitter	heart, jelly roll,
5 girl, taste	Kathy, kiss, lovely,
3 good, love, tooth	mallow, not much, Pat,
2 fruit, food, honey,	peanut, pie, pleasant,
mamma, me	Sam, sexy, sore teeth,
	Sally, Sue, Virgin
	Mary, wife.
-

TARTAN

-
73 plaid	1 ancestral, barbarian,
31 Scottish	barbaric, bagpipes, bit-
21 kilt	ter, black, Black Watch,
14 Scotland	bright, cap, Cape Breton,
8 skirt	clannishness, dress,
6 clothes	E. R. Fisher, gad, glade,
5 warrior(s)	horses, Hun, jester,
4 cloth	Maple Leaf, material
3 clan, colourful, don't	missile, music, Nova
know, scotch	Scotia, pattern, people,
2 check(er)ed, Greek	powerful, quilt, red,
civilisation, ruler	Rob, sharp taste, slave
	driver, sporran,
	stomach, strength,
	strong, Tartan Room, what?
-

TRUTH

-
51 lies	1 always, answer, children,
35 honesty	church, evil, fairness,
20 false	fallacy, fiction, gone,
9 falsehood	happiness, happy, ideal,
8 good	integrity, imagination,
7 consequences, honour	law, life, necessary,
6 tell, verity	never, noble, nothing,
5 justice, love	not me, place, pleasant
3 god, stranger than fic-	reality, right, right-
tion	eousness, search, serum,
2 best, conception, court	sincerity, Socrates,
falsehood, trust, valour	story, strange, tables,
virtue, wisdom	unrevealed, valid, word.
-

TYPHOON

59 storm	1 Annie, Asia, Betsy,
46 winds	carpetbaggers, damage,
21 hurricane	D. Dunton, dirty, dis-
6 tornado	tress, fat, fun, geo-
4 destruction, Japan	graphy, harpoon, havoc,
Joseph Conrad, rich	Helen, gals, India,
3 businessman, China	loss of life, man,
death, gale, money,	Marg., noise, Nordoff
rain	& Hall, orient, poor
	ship, powerful, sail,
	South East, squall,
	strong, swirl, tropics,
	vicious, Viet Nam,
	weather, whirlwind,
	wild, youth, zoo.

APPENDIX V

DATA FROM EXPERIMENT II, FIRST ASSOCIATIONS

Group A Repetition

CHILD	6 baby 2 infant	1 adolescent, Ann, Barbara, David, Elizabeth, face, god, little, mother young
FAMILY	5 father 2 group, home mother	1 delights, fun, house, husband, parents, together, warm
GREEN	3 trees, grass 2 blue	1 colour, emerald, favourite, fields, house, jolly green giant, New Christie Minstrels, sock, verlaine, yellow
JELLY	3 dessert, food 2 fish, jam	1 beans, fruit, jello, pudding, roll, Santa Claus, toast, wiggle
ME	4 I 3 you	1 Alan, brown, corduroy jacket, doh-ra-me, ego, frustration, house, husband, John, maybe, myself, nowhere
RICH	6 money 4 poor 3 wealthy 2 little	1 fruitcake, me, not
SWEET	6 sour 3 candy	1 babies, Barbara, bird, bonbon, jelly, John, smell, sugar, whistle
TARTAN	5 plaid 4 scotch 3 scots 2 kilt	1 drapes, material, red, Scotland
TRUTH	7 lie	1 belief, false, falsehood, god, honesty, psychology experiments, religion, verify, verite, what is it? witness
TYPHOON	5 storm 4 wind 2 hurricane	1 black, community, disaster, Joseph Conrad, Neville Shute, ugly, war.

Group B Silence Control

CHILD	4 baby 2 boys, small	1 beautiful, Bruce O., dog, girl, innocent, Liza, mother, psych- ology, son, young
FAMILY	5 mother 3 parents	1 children, communion, father, fight, house, income, large, living, sister, people
GREEN	6 grass 3 colour 2 forest	1 giant, gold, house, Robin Hood, sleeves, trees, vegetables
JELLY	3 red 2 fish, jello roll	1 dessert, food, fruit, grape, jam, non-uniform, shapeless, skimmer, soft
ME	4 I, you 2 myself, sad	1 confident, confused, exam, study, Sue, Winnie
RICH	6 poor 5 money 2 little	1 power, Richard, sail, upper-class, wealthy
SWEET	5 sugar 2 heart	1 bitter, candy, chocolate, girl, honey, light, lovable, niece, sour, taste, tang
TARTAN	6 plaid 2 colourful	1 chieftain, cloth, dust, Johnstones, kilts, power, scotch, Scotland, wearing, Yul Brunner
TRUTH	4 honesty 3 lie	1 fib, girl, god, justice, knowledge, law, moderation, quiz, religion, unpleasant, veracity
TYPHOON	3 storm, wind 2 hurricane	1 Asia, cyclone, destruction epidemic, Earth Science, flood, Florida, Mr. McCaffrey, Sara, sea.

Group C Control

CHILD	4 mother 3 baby, kids 2 infants	1 boy, developmental, father, girl, happy, hood, waif
FAMILY	4 mother 2 home, parents, love	1 child, group, husband, nuclear species, them, together, true
GREEN	3 blue, colour 2 red, yellow	1 dawn, forest, greass, Ireland, martian,nature, pasture, verdant
JELLY	3 dessert,jello 2 red, roll	1 beans, bowl, cold, colours, goo, jam, soft, preserves
ME	9 you 3 I 2 myself	1 brother, character, female, person
RICH	10 poor 3 money	1 handsome, little, man, prosperous, travel
SWEET	9 sour 3 candy 2 sugar	1 babies, bitter, taste, tooth
TARTAN	8 plaid 5 scotch	1 clan, cloth, headgear, Scotland, vest
TRUTH	4 falsity, lie 2 honesty, vir- tue	1 bible, fiction, justice, morality, serum, tell
TYPHOON	10 storm 2 hurricane, wind	1 China, Japan, sky, tornado