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# The effect of certain contexts on the denotative meaning of some adverbs of frequency

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BOSTON UNIVERSITY

GRADUATE SCHOOL

Dissertation

THE EFFECT OF CERTAIN CONTEXTS ON THE  
DENOTATIVE MEANING OF SOME ADVERBS OF  
FREQUENCY

by

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requirements for the degree  
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CHAPTER I  
INTRODUCTION

A: General Introduction

The general problem area of the study under investigation has of late been popularly defined as psycholinguistics. Essentially this term encompasses the breadth of data and theoretical concepts which are of a common interest to psychologists and students of language alike. Much of the effort expended on behalf of psycholinguistics has its roots in philosophical treatises and was further developed in early experimental psychology. Recent investigators interested in some of the classic problems of the field have had the benefit of a refined set of mathematical tools developed by statisticians and telecommunication engineers. Their experimental designs and the treatment of the resultant data has gradually gained acceptance in present day experimental psychological activities. Although our ultimate concern will be to relate the present study to these later day investigations, a brief review of some terms and concepts employed in the framework of a more general discussion of language and its relation to behavior is necessary. The review will provide the background for this study and will provide the rationale for the particular selection and definitions of terms which will be used. We shall be concerned at this time to survey the vast literature of philosophy and linguistics only insofar as it can bear directly on the terminology and concepts employed in this study.

## B. The Concept of Word Meaning

The present investigation is a study of the denotative "meaning" of certain words used in our language system. The various definitions offered for meaning, as an attribute of a word or a group of words, has been conveniently categorized by Fries (15) into

- 1, the scientific, descriptive, representative, referential, denotative, cognitive kind of meaning,

and

- 2, the emotive, expressive, non-cognitive kind of meaning.

The implications of these definitions as they affect purely linguistic considerations as well as the logical status of the concepts and theories of meaning within the various areas of linguistics, has been amply treated elsewhere and much of the relevant literature reviewed (1,2,15,17,27,44,47). An alternative categorization of distinct fields of meaning at the semantic level has been proposed by Quine (49). The first class concerns the theory of meaning as it relates to statements of logical truth or equivalence. This concept of meaning is frequently discussed within the strict bounds of logic and mathematics. It is incorporated in establishing whether sentences are meaningful or not, inasmuch as they "conform to specified rules or can be operated upon by such rules, or whether they are consistent or not with other sentences, etc." (49). The second class of Quine's dichotomy concerns meaning as a theory of reference. In this fashion the concept is utilized to provide information regarding the denotative aspect of a word's usage. By denotation we shall accept Cherry's definition (9): "The

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imputed non-causal relationship between a sign and its referent especially when the latter is a physical thing, event, or property.

Regardless of the classificatory system we adopt for the concept of meaning, different discussions of the concept will be appropriate depending on the intended function of language which is used. If language is utilized to convey or create states of an emotional or aesthetic nature, the propriety of the usage of language and a discussion of the attending meaning is determined by the success with which the utilized words achieve their goal. The meaning of the words may then be discussed with regard to their effectiveness and "goodness" (44), but any considerations of the correctness of the usage or the attending meaning would be out of place. The correctness of a word and

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The term referent has its origin with Ogden and Richards (44). In their terminology they use symbol in place of sign. Charles Morris (41) proposed that the function of denotational meaning may be classified as designates, signifies, indicates, or expresses. We shall have no need of distinguishing between designata and referent and we shall use sign, symbol, signal and information interchangeably.

2

By "language" is meant a vocabulary of signs and symbols as well as the agreed rules governing their usage. The term "sign" has been reserved by many investigators to represent any physical event used in communication, while the term "symbol" serves "to typify by association or fact" (9). Signs denote unique referents performing a sorting or classificatory function. Words may assume the function of denotation (signs) and/or connotation (symbols).

the correctness of its intended meaning is relevant only when language is used for scientific (as opposed to aesthetic<sup>1</sup>) purposes, and where the propriety of the usage is determined by the extent to which it corresponds to its referent. A word is incorrect only when it denotes something other than is demanded by the particular context or when another word in the language vocabulary may be used which is less ambiguous, or which overlaps least with other than the intended referent.

Scientific investigations have been successfully pursued in the analysis of word structure, word meaning, and word transmission (language communication<sup>2</sup>). The present study is primarily concerned with denotational word meaning, i.e., where the word is employed for scientific purposes and is a sign which refers to a specified physical referent. Although it is of interest and quite appropriate to consider the correctness of the meaning of these words, it is first necessary to describe the precision and specificity with which these words refer to its physical dimension. There are many words, for example, which are

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Ogdon and Richards distinguish the two uses of language as the symbolic use and the emotive use (44). The symbolic use is identified with scientific usage where "correctness of meaning" implies establishing the exactness of the denotational function. The emotional use is identified with the expressive or aesthetic usage where goodness of meaning implies establishing the appropriateness of the connotative function.

2

There is no intended implication that these objects of analysis are independent attributes of a word or language system. The focus of interest for an investigator in psycholinguistics dictates, however, the design of the particular experiment and the selection of the experimental stimuli and dependent variables. These three divisions are arbitrary broad guideposts to the possible avenues of approach available.

recognized as serving denotational functions (i.e., their function is known) for specific dimensions (i.e., their referent is known). In many cases, however, the degree of the relationship between the sign and its referent has not been specified, that is, the extent of the denotation to the referent dimension. Essentially, this relationship between a sign and its referent constitutes the central element of its meaning, so that a description and quantification of the relationship is a description and quantification of the meaning. As an example of the lack of specificity of the degree of relationship between a denotative word and its referent we may consider some of the words which denote the dimension of heat. Such words include hot, warm, lukewarm, tepid, cool, etc. In this case there is no question that the meaning of the word is implicit in its denotation to a thermal scale (i.e., it relates to a dimension of heat). There is no information, however, regarding what segment of the scale is referred to by warm. If such were available it might be possible to establish a criterion of correctness for the use of a particular word when the reference is made to the range of a-b degrees of heat. Similarly, little work has been done in specifying the relationship between members of a class of such denotative words which denote a common referent, that is, a more precise estimate and description of the synonymity and/or ambiguity of such words. In our example of denotative words of a thermal index, there is little information regarding the extent of the overlap in denotation (meaning) for the words warm and lukewarm. If the overlap is complete we may say the meanings are the same and the words are clearly synonymous. If there is no overlap (as we would expect when comparing hot and cold)

there are clearly independent and discriminable meanings (though not necessarily antonymous). When the overlap is partial, it appears that at least to some discernible extent the meanings are different. Yet there may not be sufficient discriminability of the words for them to be used with constancy and precision. So, although they may be used interchangeably on many occasions, (which would lead to the appearance of synonymy), they remain ambiguous, insofar as it is impossible to state the response which will be made upon the presentation of either of these stimuli. Unambiguity permits a reliable prediction of the behavior resulting from a stimulus presentation which is clearly different from the response made to another stimulus presentation. If a red (760 mu) stimulus is consistently called blue it is not ambiguous. If by convention it is agreed that the proper response to a red stimulus is to name it blue, we would then have a correct response in addition to the unambiguity. Correctness (accuracy) and unambiguity (precision) are not identical. In our example of thermal denotative words, the correctness of the word's meaning would result from the consistency with which the word is used to refer to a specific range of the thermal scale. This would be the case in other classes of denotative words. The correctness would necessarily have to be determined by the precision of its usage in the general conventional communication of the language. The necessity of establishing the meaning via a measure of precision is tenable in the absence of any other external or absolute criterion.

### G. Meaning in Information Theory

In discussing the role of meaning in information theory, Mackay (33) distinguishes between the qualitative concept of information and the quantitative measures of the amount of information. The concept of information was defined by Hartley (23) in 1928 as the successive selection of signs or words from a given list. He showed that  $N$  signs chosen from an "alphabet" of  $S$  signs has  $S^N$  possibilities, and the quantity of information is best defined as the logarithm of the expression, viz,  $H = N \log S$ . In communicating these signs it is only the physical signals which are transmitted, not their meaning. Meaning was dismissed as a subjective factor<sup>1</sup>. This negation of the role of meaning in information appears in the later refinements of the concept of information. In his theory of communication, Shannon insisted from the first that meaning is outside the scope of his theory (33). It is not questioned, that the conventional concept of meaning has no relevance to information. However, in the measurement of the information content of these signals, (i.e., the information contained in some ensemble of signs), meaning, as defined by Mackay, is compatible with the objectivity demanded by the theory. In order to appreciate Mackay's definition we should look a bit closer at some aspects of information and information measurement.

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The conventional theoretical schema for the communication of a message includes a sign, a referent, and a person. These are the same elements that constitute a triadic formulation of meaning as originally proposed by Pierce (16) and the later investigation of the triadic nature of meaning by Ogden and Richards (44). It is little wonder that information theorists stated most explicitly their assumed independence from involvements with the concept of meaning.

For the telecommunication engineer, measurement of the information content is possible only when there is communication. To set up communication the signals must have some surprise value, some degree of unexpectedness. This novelty or uncertainty is the information. It is measured by relative frequency, percentage, or probability. In this mathematical sense, information is measured in terms of the statistical rarity of signs (9). When the datum of an investigation is obtained from a behavior study we may treat the stimuli to which an organism is responding as the signals which are being transmitted. The relative frequency of the responses to these stimuli provides a measure of the information contained in the message. This adaptation of information theory to psychology has thus far largely been applied to psychophysics.

A general review of the fundamental assumptions and concepts inherent in the information model and their relevance to psychological research may be found in Miller (38, 39, 40). Quastler (48) presents more detailed material concerning theoretical limitations of the model, computational considerations, and relates them to many areas of psychology beside psychophysics. Some studies in this area are reported by Garner and Hake (18) investigating scale reading ability and auditory discrimination, Beebe-Center, Rogers & O'Connell (3) concerning olfaction, and Oshry (46) reporting an experiment in texture discrimination. It is always possible to construct a matrix in which the cell entries are probabilities of responding to the  $j^{\text{th}}$  category when the  $k^{\text{th}}$  stimulus is presented. These probabilities may be independent, or they may be correlated, so that the probabilities are a function of a specific

stimulus or pattern of stimulus presentations. It is therefore theoretically possible to construct a conditional probability matrix for a subject which would indicate the average probability of his responding to a particular stimulus of the presented ensemble. Such probabilities would not be expected to remain stable and invariant under different conditions. We should expect that a stimulus ( or transmitted message) may have the effect of modifying the pattern of the matrix probabilities. We may further expect that the same physical stimulus may differentially affect the probabilities when presented in different situations. This effect of the interaction of a signal or message with a particular ensemble, the function of producing one of a number of possible arrangements of the probabilities of the matrix, is recognized by Mackay as the meaning contained in the message.

He states:

"meaning is the selective function of the message on an ensemble of possible states of the conditional probability matrix. Selective function here implies, of course, a relationship not a happening.

"..... this (definition of meaning) leaves room for as many subdivisions of the concept as there are different ensembles; but I have not yet come across any instances in which one cannot consistently replace 'meaning' by 'selective function' or 'selective operation' leaving the sense unaltered, and giving often considerable illumination".

The problem of synonymous and multi-meaning signs becomes resolved if it is understood that there exists the possibility of a) the meaning or selective function intended by the sender of the message, b) the meaning understood by the receiver, and c) the conventional meaning assigned to the symbol or word. The oft reported "inconsistency" of two concepts

having the same meaning on one definition of the term but differing in meaning on another definition can be resolved in the same way. The meaning depends on the particular ensemble on which we propose to test the selective function. For example, the statement "That's a square" serves to select the concept of a four-sided figure enclosing four right angles. This is true if the particular ensemble (frame of reference, context, set, experimental condition, etc.) deals with geometric figures. In an ensemble concerned with colloquial social vocabulary and patterns of behavior, the word square would well serve to select quite a different concept.

The concept of selective functioning is compatible with the older vocabulary of classical experimental psychology. Boring (8) has noted that communication, for both animal and human, is possible through discrimination. Similarly, Stevens (54) later defined communication as "the discrimination of a response". The concept of discrimination and the discriminatory stimulus has been intensively studied by Skinner (52) in his analysis of verbal behavior. In both approaches, selective functioning and discriminatory stimulus control, the role of a word's meaning appears to perform an identical function.

#### D. Investigations in Word Meaning

Many investigators (42,43,45) have emphasized the impropriety of identifying the meaning contained in a verbal stimulus with a behavioral state accompanying its presentation. The meaning implicit in any stimulus is an attribute of that stimulus. Bergman and Spence (7) have stated succinctly that "An attribute is not a property of physical events or objects, but is defined by means of the discriminatory responses to such objects or events on the part of observers". To equate an attribute or a property of a word with a physical state is not only a violation of the methodology dictated by the philosophy of science but necessarily leads to tautological results. This is further emphasized by Mackay:

"Attempts have been made to define the meaning of a message simply as the behaviour-pattern it produces in the receiver; but this I think will not do. To begin with, we would not say that a message has no meaning if the receiver already knows what it is saying. A message does not lose its meaning through being repeated. And then purely on linguistic grounds one could scarcely regard the behaviour resulting from receipt of a message as synonymous with its received meaning. Any number of sentences in which 'meaning' is normally used would become grammatical nonsense if this 'definition' were substituted".

And, again in the same chapter, Mackay states:

"The meaning of a message is not identical to the state it produces. It is identified by the state it produces".

In his review of the literature concerning word meaning, Osgood (45) cites many investigators who have attempted to establish correlative states of behavior with specific conditions of meaning. The recent reports of studies on word meaning, however, indicate a

decline in the search for accompanying physiological states of meaning. Wertheimer (56) and Jakobson(28) have undertaken investigations in the relation of the sound of a word to its meaning. Jakobson's work is yet in the pilot stage and Wertheimer's report seems to be an initial phase of a more detailed program of investigation. Although this approach to word-sound-word-meaning, analysis borders on equating a physical state with an attribute, the investigators have thus far utilised the sound of a word as an independent variable and do not imply an identification with the meaning.

Noble (43) advanced the hypothesis that the meaning of a word may be inferred from its association with other words. His theoretical position is derived from a Hullian formulation of learning theory. The theory postulates that a quantity of habit strength between a word and its associates is built up. If this relation is re-enforced the first word acquires a higher probability of being associated with its paired word. Consequently, m, the unit of meaning for any word, may be obtained from the number of associations made to a given word. Staats and Staats (53) among others, have contested the rationale for establishing the meaning of a word simply by its associative strength. Their contention is that associative strength may indeed be a single attribute of word and its meaning, but it certainly does not account for the totality of a word's meaning.

Other experimenters of word meaning have utilized scaling procedures. The scale is derived from the ratings, given to a word on several different dimensions (42,45). With these rating procedures they have particularly been able to demonstrate the meaning of connotative

words. In the absence of a physical referent which may be directly related to a connotative word, the use of such rating scale procedures appears to be the simplest and most appropriate procedure. Since denotative words, by definition, are related to physical referents, it seems possible to establish the meaning of the word without the necessity of constructing additional artificial scales. The meaning may be ascertained by translating the word into the units of the referent dimension. For example, a denotative word such as 'long', when translated into the corresponding units of its referent dimension of length, should provide a statement of its denotative meaning. By utilizing the quantifiable physical dimension, the investigator is able to arrive at an estimate of the word's meaning in a relatively direct, uncomplicated fashion. This method not only affords statements relating to the position of the word, along the referent dimension, but it also makes possible an analysis of the discriminability of a class of denotative adverbs. Further, this procedure permits the introduction of contexts and the ability to describe their effect on the absolute judgment of the denotative word. Cohen and Hansel (11) have suggested this approach in studying the meaning of the three classes of denotative words: quantity (some), duration (soon), and frequency (rarely). Other dimensions of physical referents suggest themselves for similar investigation of their denotative words, as, for example, hot, cold, tepid, etc., where the referent is measured in units of degrees or calories.

The present study also attempts to describe a denotative adverb's meaning by using the physical referent as the dependent variable.

Table I presents the basic features of the studies conducted on denotative word meaning. These studies will be treated in greater detail in the next section, since they provide the relevant background for the present investigation.

TABLE I  
 COMPARISON OF STUDIES ON THE MEANING  
 OF DENOTATIVE WORDS

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Investigator	Word	Context	Physical Referent
Simpson	Adverb	-	Frequency (oftenness)
Cohen & Hansel	Adverb Adjective	1	Frequency Duration Intensity
Helson	Adjective	Denotative	Quantity
Cliff	Adverb	Connotative	Intensity
Present study	Adverb	Connotative	Frequency

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Design contained unsystematic context variations. The majority of the contexts were connotative.

### E. Investigations in Denotative Word Meaning

The present study has selected some adverbs of frequency which were presented in various specifiable contexts to two different groups of college students. The subjects were instructed to express the "meaning" of the particular adverb in the terms of the referent dimension, i.e., the percentage of time in a numerical expression. The selection of this class of adverbs and the particular experimental design were made in the interest of both theoretical and applied considerations. We will first consider its theoretical relevance in the light of previous experimentation conducted with denotative words. The first published report of an investigation of denotative meaning, utilizing the measurement of the referent dimension, appeared in 1944 by Simpson (51). In his brief report of a study conducted with 335 subjects, the author suggests in both the title and body of his report that the results indicate the "specific meanings" of these words. The subjects were instructed to report the range of the percentage of time intended by a particular adverb of frequency, and the experimenter assigned the midpoint as the tabulated response. The author made no mention of contextual variations, but neither does he explicitly assume that the meanings of the experimental adverbs would remain insensitive to any contextual changes. From what is known of absolute judgment situations in general, and judgments of verbal stimuli in particular, it would be most unusual indeed if an invariance of meaning was in fact present in this class of denotative adverbs. The risk involved in

assuming a constancy of word meaning has been aptly forewarned by Locke in 1690 (32):

"When we begin to fix by names of words .... abstract ideas .... there is a danger of error. Words should not be treated as adequate pictures of things; they are merely arbitrary signs for certain ideas - chosen by historical accident and liable to change".

The first incorporation of contextual variations in the presentation of the denotative stimuli was reported by Cohen and Hansel (11). They conducted experiments on the quantitative meanings given by children of different ages, and by adults, to three categories of words and phrases:

"The subject is shown sentences containing a word or phrase which denotes some quantity, frequency, or duration. He then writes down what he thinks is a suitable numerical value for the phrase. For instance, after the sentence: 'There are a lot of trees in the park' he answers the question: How many trees do you think there are in the park? Five grades were used for each category, and each grade was exemplified in three different contexts as follows:

<u>Quantity</u>	<u>Frequency</u>	<u>Duration</u>
Hardly any	Very rarely	In a moment
Not many	Seldom	Soon
Some	Sometimes	Not long
Many	Often	For some time
A lot	Nearly always	For a long time

Table II presents the data obtained from the adverbs of frequency. The second column appearing under each of three context conditions was not supplied by the original authors, but has been added to provide a compatible basis for comparison with the data of the other studies. The data presented in the second column is the percentage or proportion of times denoted by an adverb, and was calculated from

TABLE IIResults of the Cohen and Hansel Study

CATEGORY: Frequency  
 Numerical Values (per month)  
 Given by Adults N=27

<u>GRADE</u>	<u>CONTEXT</u>					
	Raining		Late for school		Having a cold	
	f	p	f	p	f	p
Very rarely	1.1	.04	-	-	.8	.03
Seldom	1.8	.06	.9	.03	1.0	.03
Sometimes	5.6	.19	3.9	.13	2.8	.09
Often	17.1	.57	13.6	.45	6.9	.23
Nearly always	21.6	.72	18.0	.60	16.3	.54

From: Cohen, J. and Hansel, M., Risk and Gambling: The Study of Subjective Probability, Philosophical Library, New York, 1956.

the frequency data supplied by the authors assuming a thirty (30) day month. It should be emphasized that the desired response from the subjects was the number of times a month denoted by an adverb, not the percent. This transformation to proportions is at best a gross basis for comparison with data obtained from the study being reported. In the latter situations, the instructions given to the subjects explicitly requested the percent of time denoted by the adverb. The variations in contexts were not central to the Cohen and Hansel study. As a result, the introductions of the contexts were unsystematic and no attempt was made to view the effect of a given context on the estimation of an adverb's meaning. It appears the authors recognize the importance of contextual restraints on denotative word judgment and in no way suggest a definitive description of their particular experimental adverbs. Although they do not even intimate a constancy or invariance of the denotative meaning, their data suggests that the range over all contexts for any given word is relatively stable. This must be considered with the realization that the study was completed with a total N of 27 adults and in only three context conditions. Further it may be noticed that the context selected for their study was a restricted sample of possible types of contexts which did not differ markedly either in the probability of occurrence of the event or its favorability. With this consideration in mind, the relative constancy of the denotative meanings is indicative of a reliable datum rather than an empirical oddity. The undeniable contribution of this study has been to incorporate the measurement of denotative meaning by requesting subjects to express the denotative meaning in the appropriate numerical term and by the cognizance

of the authors to the possible influence of contexts (which are modified by the adverb) in altering the denotative meaning of the particular adverb. A more sophisticated approach to the problem undertaken by Cohen and Hansel was reported by Helson, Dworkin and Michels (26). They conducted experiments wherein groups of subjects were instructed to give the numerical correlate associated with certain quantity adjectives, e.g., some, a minority, etc. Each group was given a different form containing an identical sample of adverbs, but each group was instructed to use a different base for the judgment as can be seen from their instructions:

"How many would you include in the following cases? - Some, a lot, a minority, etc."

Experimental Group I:	Given	1,728,583	people
"	"	II:	" 144,690 "
"	"	III:	" 1,232 "

Control: Indicate the percent of people designated by the following terms: some, a lot, etc.

The data obtained from the experimental groups were converted to derived percentages and compared with the control group. Helson et al found significant differences between the Control Group and Experimental Groups I and II, and between Experimental Group I and Experimental Group III. They interpreted the results as supporting a level of adaptation hypothesis<sup>1</sup>, i.e., the absolute judgment of the stimuli are made with respect to the totality of the stimulus condition

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"The adaptation level is shown to be a weighted geometric mean of the stimulus judged, all other stimuli simultaneously present as background, and residual stimuli from past experience". Michels, W.C. and Helson, H. "Reformulation of the Fechner Law in terms of adaptation level applied to rating scale data", Amer. J. Psychol., 62, 3, July 1949, pp 355-368.

which includes the background array of the stimulus situation. The judgments are predicted to shift according to the magnitude of the background contexts.

The rating scale procedure does not preclude the measurement of denotative word meaning. Cliff (10) investigated the meaning of some adverbs of intensity using the Semantic Differential developed by Osgood (45). The semantic differential consists of a number of equal-appearing interval scales, each defined by a pair of polar adjectives, e.g., "hot-cold", "good-bad", etc. When words or concepts are rated on this set of scales, it has been found that the variations in the ratings can be accounted for by three common dimensions - evaluative, activity, and potency. This instrument has been used to measure word meaning, which is defined by the profile obtained from the ratings.

Using the semantic differential Cliff (10) determined scale values for each of nine common adverbs of intensity. These adverbs were rated when presented in combination with fifteen evaluative adjectives. In his study, the subjects rated the adverb-adjective combinations with respect to their favorableness on an 11-point category scale, where "6" was identified as neutral; category "1" was labeled most unfavorable; and category "11" was most favorable. From the matrix of adverb-adjective combinations it was possible to derive a set of scale values for adverbs and one for adjectives which reproduced the values of the combinations fairly closely. Cliff was able to show that the adverbs and adjectives combined according to a multiplicative rule. That is, the intensity of each combination is the product of the rating scale numbers associated with the words. Dudek (13) has noted that "apparently the value of the adverb depends in some instances at least on the adjective it modifies". As an example he cites the

combination of the adverb "pretty" with an unfavorable adjective (pretty bad) increases the unfavorability while "pretty" in combination with a favorable adjective (pretty good) decreases the favorability. This finding was of particular interest and further emphasized the possible differential effects of favorable and unfavorable contexts in the judgment of frequency adverbs.

#### F. Relevance of the Study to Applied Situations

The considerations of the meaning of adverbs of frequency has direct relevance to many applied areas of psychology where these terms are utilized in questionnaires and rating scales. Several commonly used test batteries (20,24) incorporate frequency adverbs in their items which are judged with a "yes-no" response, e.g., "You are often guilty". In no case is an explicit anchor provided, and the only definition supplied for the adverb is a statement relating to the relative intensity of frequency. In still other tests (4,12,14,21,30,34,35,36,57) a list of alternatives is provided for the rater. These alternatives are, in many cases, identical to the experimental adverbs used in this study. An implicit assumption in the design of these tests is that the meaning of these adverbs is the same for all raters, as is also the assumption that the raters can use the various terms among the alternatives with precision. The test instruments which have been sampled from the available tests published within the last twenty years indicate that the incorporation of adverbs of frequency, for rating purposes, is exceedingly common. The extent to which the tests use adverbs varies for a given test, and only those tests which rely heavily on adverbial responses have been cited.

The use of personal and impersonal context conditions in the present study has bearing on the reported (19) discrepancies between self and objective ratings. The use of the context variables of favorability, and the personal and impersonal context variations will

provide empirical data regarding the effects of both these context conditions on the judgment of frequency adverbs.

The ambiguity in the use of these adverbs has been noted in areas far afield from psychology. The following quotation is taken from a report by physicians concerned with the reasoning foundations of medical diagnosis (31):

"At present it may be said that specific probabilities are rarely known; medical diagnostic textbooks rarely give numerical values, although they may use words such as 'frequently', 'very often' and 'almost always'."

## CHAPTER II

## EXPERIMENT &amp; PROCEDURE

A. Experimental Design

The adverbs selected for this study are:

- 1) rarely
- 2) seldom
- 3) occasionally
- 4) sometimes
- 5) often
- 6) usually

Two types of contextual parameters have been introduced. One type, the contextual event, employs the following situations:

- |                             |                  |
|-----------------------------|------------------|
| 1) intellectually brilliant | 5) bored         |
| 2) excellent health         | 6) unlucky       |
| 3) lucky                    | 7) seriously ill |
| 4) content                  | 8) stupid        |

It will be noted that some of these contexts may be described as favorable events, or events which are generally viewed as desirable by a college population, and these constitute contexts #1 - #4 inclusive. Contexts #5 - #8 are unfavorable, or situations which are judged as undesirable or aversive.

The second type of contextual parameter, the person context, concerns the personal vs. the impersonal estimate. Two forms of the questionnaire were used. Form 1 introduced each statement in the first person, viz., "I am rarely ....", Form 2 introduced each sentence in the third person, viz., He is rarely .... . Forms 1 and 2 were identical in all other respects. The personal "I am" vs. the impersonal "He is" constitute the variables of the person context, where person context is operationally defined as the grammatical voice speaking in a sentence, and which is identified by the respective personal pronoun.

## B. Subjects

Approximately 350 undergraduate students were recruited from the General Psychology classes at Boston University. They were selected and assigned at random to one of two groups, the personal (Form 1) or the impersonal (Form 2). Every subject received a copy of a questionnaire containing 48 statements.

Each adverb was paired once with every context, so that each subject was required to answer 48 items. The items were arranged in random order subject to the restriction that neither the same adverb nor the same context can be used in successive items. The face sheet of the questionnaire contained a condensed version of the following instructions, which was read by the experimenter:

This is an experiment to determine more exactly the meaning of certain words. In the booklets you have before you there are a number of sentences in which one word has been underlined. Each of these underlined words is one which is commonly used to express the frequency or the percentage of time a particular event happens. For instance, the word frequently (which is not, by the way, one of the words used in your lists) might be used in a large variety of sentences to express the fact that an event occurs a large number of times. However, the exact percentage of times the term refers to may vary in terms of the specific sentence. For instance, if we look at the sentence, "He frequently tips his hat when passing ladies on the street", frequently might mean he doffs his hat 90% of the time. Whereas the sentence "He frequently eats lobster for breakfast", might very well mean 40% of the time. In the first sentence, frequently means almost always. In the second sentence, the event occurs frequently even though less than 50% of the time. Read each of the sentences on your list carefully and mark beside it the percentage of time from 0 to 100 percent that you think the underlined word refers to. Be sure to consider each sentence as a separate case.

The response assigned by the subject on his questionnaire booklet together with some additional identifying information was transcribed by the experimenter to punch card for computational processing.

### C. Paired Comparison Experiments

In order to describe in greater detail some of the features of the contextual events used in Experiment 1, an additional set of experiments was designed. Without further specification of the context, any inferred effects of the context on the denotative judgment must assume a prior assessment regarding the extent of the context's status of favorability. Similarly, it is conceivable that the events as stated in the main experiment differ not only along the dimension of favorability, but may differ in the probability of their occurrence. The central concern regarding any differences in probability is with the probability estimates assigned by the subjects, i.e., the subjective probability of the occurrence of a particular event as judged by the subject. Experiment 2A was executed to describe the favorability aspect of the contextual event, and Experiment 2B was designed to describe the subjective probability feature of the contextual event.

#### EXPERIMENT 2A

A total of two hundred (200) undergraduate students in the General Psychology class at Boston University served as subjects. The experimental material was administered to groups of 20-30 at a time, approximately twenty such administrations of the experiment were undertaken. Prior to the actual experiment each group of subjects was instructed on the use of IBM mark sense cards. Questionnaire booklets containing 28 paired comparison statements were then distributed to each subject. The face sheet of the booklet contained the following

instructions :

INSTRUCTIONS FOR PAIRED COMPARISON

This booklet contains a series of statements which are presented in pairs. Each item is a description of some event. For each item (for each pair of events) you are asked to indicate on the IBM mark sense card which member of the pair is generally the more frequent, the right hand member of the pair, or the left one. The left side member of each pair will always carry the code "1" and the right side of any pair is coded "2". Place a one or a two in the appropriate location of the IBM card to indicate your choice. The column number of the card is identical with the item number in the questionnaire, i.e., the answer to item "1" should appear in card column 1, etc.

Be sure you understand the task required and how to score your answers before you begin.

Answer only on the IBM card and within the allotted space.  
USE ONLY THE IBM PENCIL TO MARK THE CARD.

Be sure to answer every item. Do not skip any item(s). Once you have answered an item do not return to it; continue with the remaining ones until you have completed the entire list of paired sentences. There are no right or wrong answers, and in general the first response is preferred to studied, thought-out responses.

These instructions were read by the experimenter with the group to insure that no ambiguity existed either with respect to the use of the mark sense card or with the desired response.

Each of the eight contexts used in Experiment 1 was paired with every other context, so that the total of paired statements numbered  $28 \left( \frac{n(n-1)}{2} \right)$ . The contexts were presented four items to a page, so as to prevent referral by the subject to any previous items already completed. The preparation of the booklet attempted to eliminate errors of positioning (no consistent presentations on the right or left column)

or pattering (each of the four items of any page were representative of varying degrees of frequency).

One-half of the subjects ( $n = 100$ ) received booklets in which each context event was prefaced by a first person pronoun (I am lucky ... ) and the other half received booklets prefaced by a third person pronoun (He is lucky ... ). The assignment of groups to Form I am and to Form He is was random. The subjects were not informed of any person context variation until the close of the experimental session. The booklets issued to the two groups were identical in all other respects.

#### EXPERIMENT 2B

Using a different sample of two hundred undergraduate psychology students as subjects, an identical booklet of paired comparison items was prepared. As in the previous experiment 2A, the same precautions were taken regarding the preparation of the items. The body of the booklet, the method of responding on mark sense cards, procedure and instructions for issuance of the booklets, and the method of assignment to Person context, I am, He is, were all identical to Experiment 2A. In experiment 2B, however, the subjects were instructed to judge the pairs of statements on the dimension of favorability rather than frequency of occurrence of the event.

#### EXPERIMENT 2C - Control Group

Following the paired comparison task, the subjects in Experiment 2A were instructed to denote numerically the "meaning" of

the adverbs which were the experimental stimuli used in the main experiment, Experiment 1. The six adverbs were listed in a random order and the responses were recorded by the subjects on the same mark sense card used for the paired comparison experiment. Any two digit number from 00 to 99 was allowed.

## CHAPTER III

## RESULTS

A. Analysis of Mean Scores

The responses from the subjects of each of the two main person-context groups were analyzed separately. For each such group the means and standard deviations were obtained for each word per context condition. The data for Group I has been presented in Table III and for Group II in Table IV. The means and standard deviations of each of the two control groups are presented in Table V. From the resulting mean scores obtained for each word, the ordinality of the experimental adverbs along the denotative dimension of frequency is shown to be:

Rarely, seldom, occasionally,  
sometimes, often, usually

This ordinal assignment is unchanged through all groups, whether experimental or control. The data was further analyzed using a three way factorial analysis of variance design. The design may be schematically represented by Fig. 1. The results of this analysis appear in Table VI. In all cases the cell entries were group means of a particular word for a particular group. The number of entries per cell were obtained by selecting all mean scores for the contexts which represented favorable events or unfavorable events as required. The results indicate that of the main effects only the factor of favorability context, independent of other variables, failed to reach the .05 level of confidence. The interaction between person context and favorability and the triple interaction term likewise were found to be non significant at the .05 level. These results imply that any variations in responses

are not attributable to the factor of favorability independent of the particular person-context group or series of experimental adverbs, but rather must be regarded as a chance expectancy. Similarly we may interpret the results of the favorability by person context interaction in an identical fashion, i.e., variations between levels of favorability and person context do not differ significantly from random fluctuations. This may be restated as follows: The judgment of the denotation of the adverb is shown to be affected by the favorability of the context and its interaction with the particular adverb, and by the interaction of the person context with the particular adverb. No significant differences in the responses are attributable to the person context and favorability interacting, when the interaction is considered independent of the adverbs. Further it may be said that significant differences were found between the adverbs used in this study, independent of the other variables. Significant differences were also obtained between the condition of an "I am" context modifying an adverb and a "He is" context modifying the adverb. Significant differences should then be expected if the judgment of an adverb is required in the presence of a person context, or when modifying events which differ in the favorability of the event depicted. There is no reason to assume an inherent difference between members of Group I and Group II, since they were randomly sampled from the same population. The resulting significant difference is attributable to the effect of the person context which was introduced in the experimental sessions. Since both the differences among the adverbs and the differences between the groups met significance at the .01 level of confidence, it is indeed possible that when

considering favorability independent of the remaining two factors, the factor of favorability was sufficiently masked so as to render any resulting differences as a main effect non significant.

The results of the paired comparison study are presented in Table VII. It is evident that whereas the ranked sums for the frequency judgments are scalable, the judgments made on the dimension of favorability are clearly dichotomized, with no overlap between the last member of the favorable context and the first member of the unfavorable context condition. The contexts were then properly regarded by the subjects as being either favorable or unfavorable. The effect of the favorability aspect of the judgmental situation becomes evident in the interaction term, not as one of the main effects.

From the mean scores of the control group we may note that the control subjects distinguished to a greater extent between rarely, seldom, occasionally, and sometimes, than did either of the experimental groups. That is, the control group used more gradation of the 0-100 scale than did their experimental counterpart. This is further evidenced in the informational analysis which was performed for all subject groups involved in the experiment.

TABLE III

Group I Mean Scores (top) and Standard Deviations (bottom) for each  
Word and Context Condition

---

	<u>Rarely</u>	<u>Seldom</u>	<u>Occasionally</u>	<u>Sometimes</u>	<u>Often</u>	<u>Usually</u>
Context 1	16.84	20.12	29.16	35.14	73.20	72.34
2	17.12	20.10	30.71	39.32	77.54	82.35
3	19.03	21.01	31.57	39.32	64.85	73.78
4	20.77	23.93	34.09	39.93	75.55	78.14
5	20.64	24.81	28.80	34.80	67.62	71.06
6	22.51	25.92	29.30	34.55	69.43	69.09
7	21.19	23.53	25.42	28.50	63.48	68.01
8	20.41	22.58	22.57	26.47	66.01	68.57

\*\*\*\*\*

Context 1	19.74	20.31	16.93	16.19	17.77	19.07
2	21.18	21.36	19.95	21.61	15.55	12.06
3	20.79	18.59	20.07	18.55	17.85	18.36
4	22.90	22.19	19.61	20.11	15.76	15.11
5	24.82	25.24	18.79	18.67	22.76	22.15
6	28.30	26.81	19.21	18.11	20.52	25.18
7	26.71	25.63	16.51	16.85	24.50	26.72
8	28.14	27.33	16.45	18.80	26.14	27.78

\*\*\*\*\*

TABLE IV

Group II Mean Scores (top) and Standard Deviations (bottom) for each  
Word and Context Condition

---

	<u>Rarely</u>	<u>Seldom</u>	<u>Occasionally</u>	<u>Sometimes</u>	<u>Often</u>	<u>Usually</u>
Context 1	17.94	20.93	27.73	35.51	74.94	79.83
2	26.81	26.89	30.42	36.78	76.84	83.19
3	27.82	24.15	29.52	35.32	64.73	78.19
4	26.70	34.16	31.14	34.39	75.68	80.50
5	25.40	32.64	26.67	33.08	71.82	74.39
6	23.94	31.95	27.19	37.31	73.62	78.64
7	30.03	27.18	26.30	29.04	71.67	77.51
8	23.13	31.01	25.36	26.44	69.53	74.73

\*\*\*\*\*

Context 1	23.28	20.84	15.71	17.33	16.56	14.00
2	30.89	27.09	17.27	18.04	16.36	13.04
3	30.86	23.93	18.98	18.29	17.77	14.60
4	29.31	31.10	18.42	17.06	15.01	11.92
5	29.27	31.72	17.27	19.84	19.65	18.65
6	31.00	32.35	18.26	19.05	17.58	16.73
7	35.35	30.49	18.65	17.52	19.52	20.13
8	30.27	33.87	19.05	17.84	21.39	20.52

\*\*\*\*\*

TABLE V

Control Group Mean Scores (top) and Standard Deviations  
(bottom) for each Word

	<u>Rarely</u>	<u>Seldom</u>	<u>Occasion- ally</u>	<u>Some- times</u>	<u>Often</u>	<u>Usually</u>
Control Group 1	7.96	13.50	26.42	40.48	76.79	77.43
Control Group 2	10.82	13.61	26.40	43.64	73.52	75.26
Average of Groups 1 & 2	9.39	13.56	26.41	42.06	75.16	76.35
Control Group 1	12.41	12.00	15.87	12.71	14.51	15.34
Control Group 2	13.10	11.13	14.81	17.90	20.81	20.42

\*\*\*\*\*

TABLE VI

## Results of Analysis of Variance

---

Source	df	ss	ms	f	Decision
Groups	1	196.97	196.97	11.57	Reject at .01
Favorability	1	11.08	11.08	not sig.	-
Adverbs	5	45,761.70	9,152.34	529.04	Reject at .01
Group x Favorability	1	21.43	21.43	not sig.	-
Group x Adverb	5	214.29	42.86	2.48	Reject at .05
Favorability x Adverb	5	436.79	87.36	5.05	Reject at .01
Group x Fav. x Adverb	5	29.82	5.96	not sig.	-
Within	72	1,245.93	17.30		
Total	95	47,918.01	5,044.00		

---

\*\*\*\*\*

TABLE VII

RESULTS OF THE PAIRED COMPARISON STUDY FOR GROUP "I AM" (1) AND "HE IS" (2)  
WITH RESPECT TO THE DIMENSION OF FREQUENCY (A) AND FAVORABILITY (B).

		CONTEXTS								
		1	2	3	4	5	6	7	8	
(A)	(1)	$\Sigma P_{jk}$ freq.	2.56	5.15	4.40	5.43	2.96	4.53	2.26	0.65
		revised rank	6	2	4	1	5	3	7	8
	(2)	$\Sigma P_{jk}$ freq.	2.13	4.01	3.89	4.93	3.18	5.30	2.96	1.81
		revised rank	7	3	4	2	5	1	6	8
(B)	(1)	$\Sigma P_{jk}$ fav.	5.03	5.75	4.97	5.93	2.16	2.95	0.97	0.84
		revised rank	3	2	4	1	6	5	7	8
	(2)	$\Sigma P_{jk}$ fav.	5.10	6.07	4.45	5.71	2.10	2.98	1.17	0.43
		revised rank	3	1	4	2	6	5	7	8

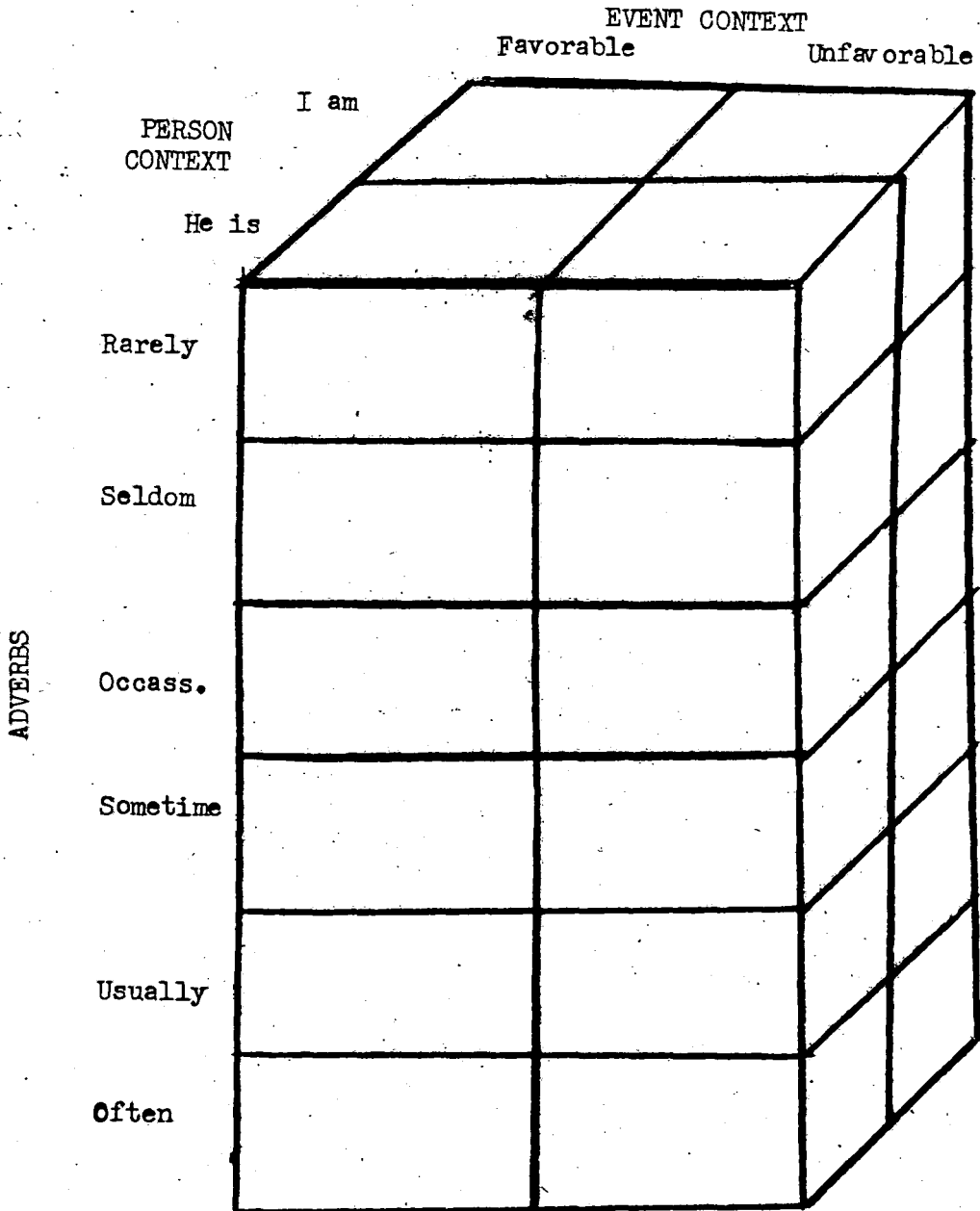


Figure 1

Schematic Representation of the Analysis of Variance

## B. Informational Analysis

An information analysis of the data was performed using the computational schema provided by Garner and Hake (18), in which response information is the limiting factor for obtaining the resultant amount of transmitted information. The essential feature of such an analysis is derived from a frequency matrix of the responses. The columns (adverbs) are regarded as stimuli which are being transmitted across a channel (the number of subjects constituting the group) and received by the system of rows (response categories). The interpretations of the analysis are valid only for the specific ensemble under consideration, namely, these particular six stimuli, these particular response categorizations, and the number and nature of the subjects used. The results are presented in Table VIII. Except for the control group, which transmitted an average of one bit of information which is representational of two discriminable response categories, the groups were unable to utilize more than one response category without error. The response information is relatively the same for all groups. What affects the low amount of transmitted information is the response equivocation, or the inconsistency of assigning word "rarely" to response category on one occasion and to a different category on another occasion. This is indeed a noisy channel with considerable noise being introduced from inter subject variability of responding. This problem will be discussed further in the next chapter. For the moment it should be emphasized that the data was treated with the intent of including the pooled responses in a single group response. The formulation of the original problem was designed to establish normative data. Individual differences,

insofar as they contribute to the diminution of precise responding are integral parts of the group being investigated. The very nature of the study, designed as it was to investigate the denotative meaning derived from a group of subjects, precluded the analyses of individual protocols or the control of these individual differences. To have done so would have been to confound the nature of the original problem.

Miller (39) has provided a method for applying a chi-square test of independence between the rows and columns of a matrix used in an information transmission model. The results of the chi-square test of independence indicate that in no case was it possible to reject the null hypothesis at the .05 level that this particular ensemble of rows and columns are independent. This result is not astonishing when one considers the implication of the  $I_t$  that at best two response categories were discriminable with maximum consistency and without error.

Figure 2 provides a graphic description of the effect of the favorability variable on the judgment of the respective adverbs. The coordinates for a particular adverb are the mean score obtained as a percent statement (abscissa) and the algebraic (sign included) difference between the mean score obtained when the word was presented in a favorable context and an unfavorable context. The analysis of variance indicated the interaction of group by favorability as a non significant factor. Consequently, the difference between the curve from Group I and Group II is not a significant one. The individual group curves have been included in the graphic representation to indicate that the group average is generally a function which may be fitted between the groups which are consistently different, rather than the result of averaging overlapping

scores which would not otherwise appear in a plot of an overall average series of responses. From the figure described it is clearly evident that favorability results in more disparate judgments regarding the denotation of adverbs which are either clearly low frequency denoters or high frequency denoters. The intermediary adverbs of "occasionally" and "sometimes" appear to be least affected by the change in these context conditions. Further, it will be noticed that with the exception of "rarely" and "seldom", the estimates obtained under contexts of unfavorability are numerically greater than the corresponding responses given under favorable contexts.

Figure 3 was prepared in a similar fashion. In this figure individual curves for favorable and unfavorable conditions were presented along with the overall differences of judgments obtained by the introduction of the person context ("I am" or "He is"). As was true for favorability, the effect of the person context in altering the denotation of an adverb is least for the intermediary adverbs "occasionally" and "sometimes". Group 2, i.e., person context "He is", is generally numerically greater in the estimate of the percent of time denoted by an adverb, except for the intermediary adverbs.

TABLE VIII  
Results of the Informational Analysis

Group	$I_r$	$E_r$	$I_t$
<u>I am</u>			
Favorability	3.212	2.536	0.676
Unfavorability	3.170	2.638	0.532
Pooled	3.195	2.608	0.587
<u>He is</u>			
Favorability	3.203	2.527	0.676
Unfavorability	3.176	2.591	0.585
Pooled	3.193	2.577	0.616
<u>Groups 1 &amp; 2</u>			
Favorability	3.211	2.544	0.667
Unfavorability	3.178	2.630	0.548
Total pooled over favorability and groups	3.198	2.603	0.595
*****			
Control Group 1	3.1887	2.061	1.128
"    "    2	3.1969	2.272	0.925
Pooled Groups 1 & 2	3.200	2.216	0.9838
*****			

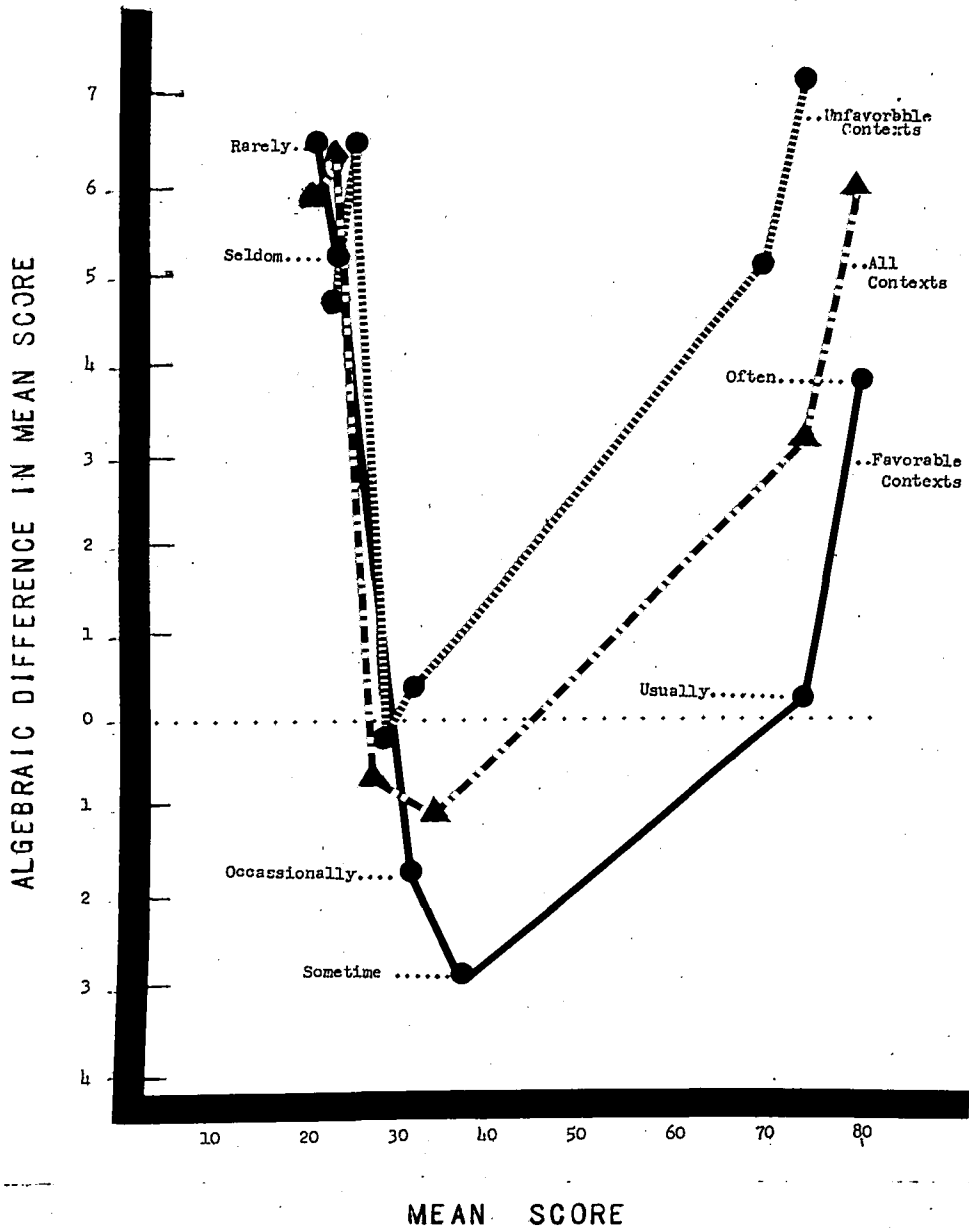


FIGURE 2

GRAPHIC REPRESENTATION OF THE EFFECT OF THE PERSON CONTEXT

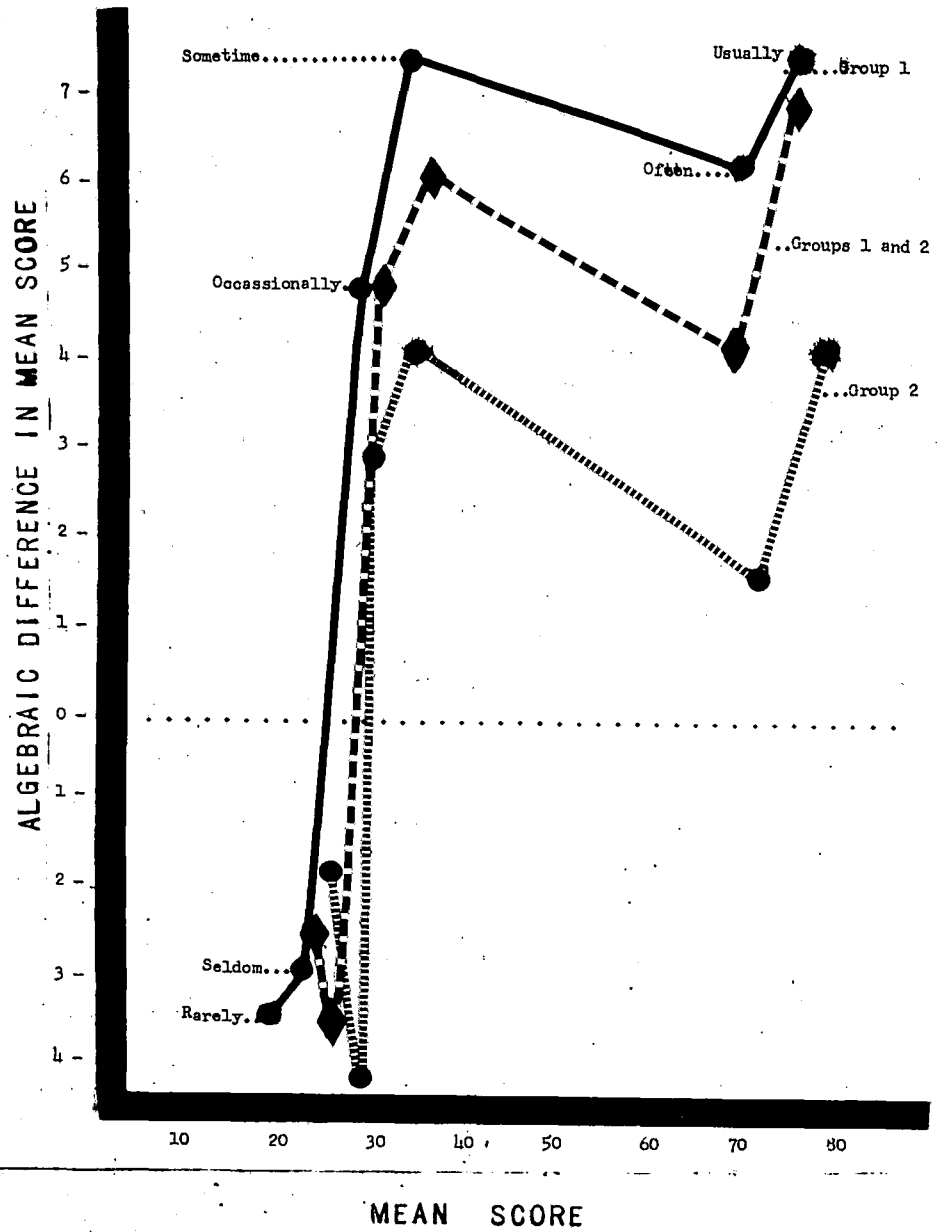


FIGURE 3

GRAPHIC REPRESENTATION OF THE EFFECT OF THE EVENT CONTEXT

### C. Nature of the Mean Score Differences

The nature of the differences between groups and conditions of favorability is amplified in Table IX. In this table the mean score for each word has been averaged for all conditions of favorability. A similar table is presented for the average variances, labeled Table X. It is interesting to note that the variance is generally consistently greater in the unfavorability context conditions (except for words "occasionally" and "sometimes" of Group I), and the amount of transmitted information is likewise greater in the favorable context conditions. Further, it may be noted that the variance in responses to words denoting a low degree of frequency ("rarely" and "seldom") is greater than the variance in response to words denoting a higher degree of frequency, ("usually" and "often"). Above all, it should be noted that the variances obtained from the responses of the control group are less than either of the experimental groups, although still admittedly quite large. From the consistent behavior of the words "rarely" and "seldom" as compared to the words "often" and "usually" under the different conditions of favorability, it is suggestive to attempt a categorization of "low frequency" denoters and "high frequency" denoters. The intermediary denoters, "occasionally" and "sometimes", appear to conform to the high frequency denoters more often than to the class of "rarely" and "seldom". Favorability tends to yield a group response for low frequency adverbs with a mean score less than its response in an unfavorable situation, while the favorable context condition produces responses for the high frequency adverbs higher than the mean score obtained in an unfavorable situation. It is possible to view these



TABLE X

Table of Variance Obtained for each Adverb

---

<u>GROUP 1</u> <u>(I am)</u>	<u>Rarely</u>	<u>Seldom</u>	<u>Occasionally</u>	<u>Sometimes</u>	<u>Often</u>	<u>Usually</u>
Favorability	482.18	424.76	367.99	369.40	281.14	268.62
Unfavorability	767.95	630.65	316.32	328.48	555.66	652.58
$\bar{X}$	589.63	527.71	342.15	348.94	418.40	460.60

<u>GROUP 2</u> <u>(He is)</u>						
Favorability	834.03	677.01	311.15	312.83	270.74	180.32
Unfavorability	1041.25	1032.38	335.60	345.44	383.44	363.50
$\bar{X}$	912.13	854.69	323.37	329.14	327.09	271.91

\*\*\*\*\*

results as a differential effect of favorability on words of low and high degree denoters. No intensive investigation of this hypothesis has been pursued, because it is somewhat tangential to the goals set for the main study, which was primarily concerned with establishing the effect of both favorability and person context upon the judgment of frequency adverbs.

## CHAPTER IV

## DISCUSSION

A. General Implication of the Results

The hypothesis concerning context favorability as a parameter of the adverb judgment situation has been supported. This hypothesis was suggested from Cliff's data as was noted in an earlier chapter. That favorability emerged as a significant factor in this judgment situation is all the more interesting when we consider that the effect emerged despite the noise introduced by inter and intra individual variabilities. It is indeed possible that because of the large variances favorability was not a significant main effect. The implications of these results clearly indicate that:

- 1) an adverb's meaning is hardly stable and invariant
- 2) the discriminability of a series of adverbs via a pooled group channel is dramatically poor
- 3) the meaning of an adverb defined by a group's responses is not comparable to the meaning defined by any of its individual subjects. The effect of pooling across many subjects in a group seriously impairs the maximum precision which would otherwise have been obtained. Individual performances allow for more than one or two discriminable categories as has been shown by Cliff, and in an early pilot study by this investigator.
- 4) context conditions do not universally tend to improve performance. From the data of the control group the reverse appears to be the case. That is, in this type of absolute judgment situations where the datum under investigation is the pooled group response, the introduction of person and event contexts tends to maximize equivocation. Data is not available at this time to indicate whether the situation would be true had other context conditions been used or had different denoters been investigated.

Serious doubt is cast on the interpretation of rating scales

and tests which depend upon the pooled group response to denotational adverbs. Similarly, the selection of a sample of quantifying adverbs for use as alternatives in a measuring instrument must presuppose the discriminability between such words. The discriminability data arrived at by pooling over a wide range of subjects does not appear representative of individual discriminability. The orthodox definitions concerning the meaning of an item arrived at by "the conventional usage" are indeed questionable, if by convention is meant the "average, pooled" responses made in the presence of the particular term.

## B. Variability of Responses

In both the control and experimental groups a high degree of variability of responses was found for each word. The individual response protocols reflected some of the types of individual differences which have been reported by other investigators. Mosier (42) has noted in an incidental fashion that a number of his subjects tended "to mark words either at the extremes or toward the neutral value". In Osgood's study (45) it was reported that some subjects used categories 1 and 7 exclusively, others used 1, 4 and 7, and still others used the entire scale. In the present study similar differences were readily found, in that some subjects restricted their responses to the low end of the 0-100 scale exclusively, others using that portion of the scale from 50% upwards, and still others using the entire range of possible scale values. In most instances the "round number effect" noted by Johnson (29) as a common occurrence in responses scales of judgments is pronounced. The inter individual differences may be partially accounted for by the different anchors created and used by a given subject, and which might well differ for another subject. Explicit anchors were not introduced in this study. This was partially necessitated by the desire to provide "the conventional meaning" as defined by a group, and the conventional situation which requires the judgment of the adverb does not provide any explicit anchors. Even in the absence of an explicit anchor, some form of anchoring may be effectively present. In this connection, Johnson (29) has stated:

"It is likely that our daily value judgments are made on a scale which is anchored at some such ideal reference point. Scales in which

categories are percentages, and other scales which are bounded by zero and unity, are probably anchored at both ends. This end anchoring would appear to yield an advantage in respect of inter-individual consistency which has not been exploited in practice".

Similarly, Helson (25) has remarked on the technical inaccuracy of referring to the method of "single stimuli" or "absolute judgment", since a real possibility exists that anchors, in the form of past experience to stimuli as well as the immediate range of stimuli presented to the subject, are present and likely to constitute anchoring points for his subsequent judgments.

The extreme variability becomes apparent in the information transmission analysis where pooling the subjects' responses introduces a vast amount of response equivocation and drastically reduces the amount of transmitted information. The general problem of pooled subjects' responses has been aptly stated by Senders (50):

"When a man makes a discrimination about a stimulus and reports the results of this discrimination, he is acting as a communication channel. The stimuli constitute the information source, and the man's responses, the output. If he always makes the same response to any given stimulus, and makes a different response to each of the different stimuli, then he is a noiseless channel. The only kind of noise which can reduce information transmission in such a system is that which results from the man's inability to respond differently to different stimuli, which introduces stimulus equivocation. If he makes several different responses to any given stimulus, but none of these responses is made to any other stimulus, response ambiguity is introduced, but no stimulus information is lost.

When two or more men make simultaneous discriminations and their responses are pooled, the two together may also be thought of as a communication channel. In this channel equivocation may come not only from the failure of either man to make consistent discriminations among

the stimuli, but also from their failure to agree on the proper response to any given stimulus. In other words, each man considered alone may be a noiseless channel, but the two together pooled may transmit less information than either alone. Because the addition of men to a pooled channel can never reduce the noise contributed by any of the individual men, but can add noise resulting from differences between them, it follows that information transmission must always be reduced by such a transmission.

The problem may be rephrased in more conventional statistical terms. If one subject makes responses to a number of stimuli, the only error variance comes from that subject's failure to make consistently different responses to different stimuli. If more than one subject makes such responses, variance is also contributed by the difference between subjects' response patterns".

### C. Variability as related to the Judgment Task

The inter subject variations were in some instances quite striking. It was not at all uncommon to find subjects who regarded word "rarely" as denoting 60% of the time or more. The recurrence of this type of response in a sample as large as the one used leads one to believe that such responses are more than simple discrepancies or aberrant responses. Mosteller, in a personal communication, has suggested that subjects may tend to render "mirror responses". By this he meant that they will supply the complement to the desired response. For example, when judging a high intensity or frequency stimulus of a given dimension, the subject may supply an answer which is a mirror of the appropriate response. The data from the present experiment indicates that the subjects respond both appropriately (i.e., denoting 'rarely' as a low frequency adverb) as well as providing a mirror response (i.e., denoting 'rarely' as a high frequency adverb). Such instances of mirror responses were found not only among different subjects but appear within a single response protocol as well. This is to say that variability may be attributed to:

- a) inter individual differences not due to mirror responding
- b) inter individual differences due to mirror responding
- c) intra individual difference

The first of these sources of variability, as it affects the pooled results, has been treated in Senders' analysis. The second and third category, i.e., some subjects responding in a mirror fashion, and a single person shifting his estimate within an experimental session from

non-mirrored to mirrored, may be partially accounted for in a single explanation<sup>1</sup> .

A possible source of intra individual variability may have been unintentionally introduced with the introduction of the contexts themselves. The added nature of this variable may be better appreciated when consideration is given to the various possible approaches to the measurement problem. One approach, the stimulus centered or judgment approach, attributes the systematic variations in the reactions of the subjects to stimuli, to differences in the stimuli with respect to a designated attribute.

"The immediate purpose of the experiment is to scale the stimuli which alone are assigned scale values. In this approach the subjects are considered as replications. Adding subjects chosen at random from the same population or deleting subjects at random, would have no effect either on the procedure or the results other than the usual sampling fluctuations".

The other approach, the response approach, ascribes the variability of reactions to stimuli, to both variations in the subjects as well as in the stimuli. These two approaches to scaling set basically different tasks for the subject. The comparison may be summarily stated as follows:

"In the stimulus centered or judgment approach, the task set for the subject is to evaluate the stimuli with respect to some designated attribute. The subject responds to a stimulus with respect to its relation among the other stimuli in the defined continuum. (Other stimuli here may refer either to

---

1

The ensuing treatment and distinction between the task of judging versus responding is based in its entirety from Torgeson (55). The indented passages are quoted from this work.

stimuli that are present at the time of the judgment or to stimuli experienced at some time previous to the particular judgment). Since the subject responds to the stimulus on the basis of its relative position among other stimuli, the effect of his own bias is minimized. In the response approach, the task set for the subject is to respond to a stimulus on the basis of the position of the stimulus in relation to the subject's own position with respect to the attribute. The subject's own attitude, feeling, or ability is an important factor in his response".

The relevance of the distinction between these two judgmental tasks to the possible source of the variances obtained in this study will now be clearer. The instructions required the subjects to "judge", i.e., objectively scale the stimulus on the attribute of frequency. This task precludes the introduction of the subjects' personal attitudes to the judgment situation. The item "I am rarely lucky" requires the subject to state the percent of time denoted by "rarely" independent of his own personal rarity of luckiness. The response approach would have required the subject to respond to the adverb "rarely" relative to the other adverbs on the frequency dimension as well as in relation to his own position on the attribute of frequency. It is therefore suggested that the person context and the event context have exerted sufficient control over the judgmental situation to alter the pre-established task set for the subject from a "judgment" task to a "response" task. In this fashion the subject responded (at times) to the adverb independent of contexts and was a judge of the stimulus. At other times he lapsed into the role of a respondent where the judgment of the word contained aspects of his feelings, attitudes and biases from prior experience with the context conditions. This observation cannot at this

time be supported from the data obtained from the present study for several reasons. Primarily, the goal of this study was to establish the meaning of the adverbs as used by a large population of the English-speaking world. As such the design required an emphasis on the establishment of normative data rather than individual difference. No procedure was available to separate out scale positions for the subjects by subject variations. Equally important is the consideration that no indication of contextual modification of the judgment task could have been anticipated at the outset of the investigation. The possibility of the context modifying the type of task from a response to a judgment task is suggested as a post hoc evaluation which may prove fruitful in ensuing research.

The responding in a mirrored fashion may be regarded as a shifting of anchors brought on by the absence of a definite, explicitly provided anchor for either the particular word or context. Bendig (5,6) has shown that a reduction in the numbers of response categories or the introduction of anchors provides greater reliability in the judgmental situation. Some indication of the contexts providing a source of ambiguity is suggested from the results of the control group, which responded to the adverbs in the absence of any contexts. In this case, the variance was greatly reduced. It is tenable to assume that the subjects did in fact approach the stimulus judgment situation as a stimulus centered judgment, and that the major variance is attributable to inter-subject variability.

#### D. Relationship of this study to a Level-of-Adaptation Interpretation

The original contribution of suggesting contextual variations in a psycholinguistic design of this sort belongs to Hansel and Cohen. In their study no attempt was made to quantify the contexts, contextual differences, or to quantify the relationship between a context and the stimulus to be judged. The first of such attempt was undertaken by Helson. In his study, it will be recalled, his background conditions which are analagous to the context situations employed in the present study were investigated and found to affect the absolute judgment of the adjectives. Helson attributes his resulting differences to a level of adaptation phenomenon. In contrast to Helson, the present study makes no attempt to present a theoretical formulation to relate the differences attributable to the contexts which were employed. The first and foremost contribution of the study will lie in the description of the adverbs by means of a "composite subject". In providing this description the author has not felt compelled to integrate his findings in a unitary theoretical schema. Some justification is necessary, however, for the reluctance to relate this study to impressive series of experiments which have attempted to bring further support for the level of adaptation phenomenon. With regard the adaptation to a favorability level, the inability to scale the contexts on this dimension does not allow for such a quantified analysis. Secondly, the phenomenon is not found as a sensitive detection, but requires substantially incremented levels of differences between contexts for the effect to be significantly evident. The present study has shown that the difference between the adverbs used was strikingly significant so as to mask favorability as a

main effect, and the factor of "I" vs. "He" was similarly overshadowed by the significance of the adverbs. The nature of mere differences of favorability are not sufficiently large for the phenomenon to be tested.

The argument may be advanced that an adaptation level to the relative occurrence of the events depicted by the contexts may have been operative. That is to say that the subjects' estimate of the relative frequency of 'lucky' as opposed to 'bored' may have exerted sufficient control, as Helson's variations in background exerted the control with which to demonstrate the existence of a level of adaptation phenomenon. If this were the case, the implication for the results of the present study is necessarily that the parameter affecting the judgment of the adverb was not favorability at all, but rather the subjective probability of the occurrence of the event. It should be emphasized that what is important is not the absolute frequency of occurrences of the event but rather the subject's estimate of the relative occurrences, since it is relative estimate, if at all, which will affect the judgment and cause him to adapt to the appropriate level.

Indeed, the results of the paired comparison experiment indicated that three of the four favorable events are also judged as being more frequent events. It is necessary to demonstrate that what is in fact operative is truly favorability, not frequency.

A reanalysis of Helson's data will be attempted to demonstrate:

- a) the level of adaptation phenomenon is not readily apparent or evident under relatively normal background variations
- b) if the Helson study is representative of the requirements

necessary for obtaining evidence for a level of adaptation hypothesis, the phenomenon is unlikely to be found in this study.

Finally, it will be shown that the operative parameter in the present judgmental situation is in fact favorability rather than frequency. It is interesting to note that Helson et al (26) selected as a control group those subjects for whom the judgment response to the quantity adjective was made against a background of 100, or expressed as a percentage. The data from the experimental groups were converted to derived percentages and compared to the control group. The investigators took the precaution of creating backgrounds (contexts) which the subjects could not readily transform to a percent judgment. Considering the instructions given the control group and the design of the backgrounds for the experimental groups, one is led to believe that the investigators considered that responses made in a percent form would not provide evidence of adaptation to various levels of backgrounds, and such responses are therefore ideally suited for a control group. Had all groups been instructed to respond initially with a percent score, there is no indication that the data would support a level of adaptation hypothesis. Apparently, only when comparing "derived" percentages with the control group has such evidence been available, with exception of the extreme backgrounds within the experimental groups, whose derived percent scores are significantly different. Other psychophysical studies have shown that data obtained from different operations measuring the response to a constant stimulus configuration are not necessarily identical. In fact, they are most likely to yield different statements. Viewed in this light, the meaningfulness of the comparison of derived

and non-derived percentages, i.e., responses resulting from two different sets of operations, is questionable. The situation is analagous to an experimental group instructed to give absolute judgments of height and width to each of a set of stimuli, and requiring a control group to give the area for the same set of stimuli. If the experimental group's height-width data are now transformed to area data and compared with the control group, one should not be surprised at the resultant discrepancies. The effects of adaptation level, therefore, are possibly confounded because of the different experimental operations which are involved.

Conceivably, it may be argued that the contextual events used in the present study differed sufficiently along the dimension of their subjective probability of occurrence for any given subject to effect a level of adaptation behavior similar to the varying background contexts used in the Helson study. This would be possible if the particular adverb is modifying events (analagous to a judgment made against a background of contexts) which differ in subjective probability, i.e., there is a substantial difference in the subject's estimate of the relative occurrence of a particular event in the total population of events, from the subjective probability of a neighboring event. This may lead to differing estimates of an adverb's meaning, when the adverb is presented in the various conditions of contextual events. If this is true, any resulting differences in the estimate of the denotation of a particular adverb may be attributable to context differences in subjective probability, above and beyond any contextual differences of favorability. Inspection of Helson's data, however, would support the

unlikeliness of an adaptation effect in the present study. Helson et al were able to obtain significant differences between their experimental groups only when background variations differed by a factor of 100 or more. It would appear that to obtain similar results from a study incorporating the judgment of an adverb against a background of an event having subjective probability  $x$ , vs. subjective probability  $y$ , etc., one would be required to select contexts whose subjective probability values differ by a factor of 100. Hypothetically, the following contexts represent a scale separation along the dimension of subjective probability; and are simultaneously dichotomized with respect to the dimension of favorable-unfavorable:

ecstatically elated vs. tired  
chronically melancholic vs. feeling ok

In both cases the event described by the right hand member of the pair occurs with sufficient regularity so as to be judged a probable, likely event on the order of "40-60% of the time". The left member of each pair, not being a common experience to most members of a college population, can be expected to be judged as a highly infrequent, unlikely event occurring on the order of .01% of the time, or less. Perhaps events differing along the dimension of subjective probability with a magnitude exemplified above may be suspect of effecting results attributable to a level of adaptation judgments, independent of the favorability variable of the context. It does not appear likely, however, that bored vs. content, or lucky vs. unlucky differ sufficiently in the subjective probability of their occurrences so as to attribute any resulting significant differences in the scores obtained from an adverb when presented with either member of a respective pair of context conditions,

to a level of adaptation phenomenon, where the alternative hypothesis of accepting the variable of favorability as the parameter of the judgmental situation is simpler and appears tenable.

To establish the operative parameter as favorability rather than subjective probability we will now return to the data from the paired comparison experiment. Under both conditions of the person context (I am and He is) four independent groups of subjects, 100 per group, completed 28 paired comparison judgments. Two groups of subjects assigned a member of each pair as being "more frequent" and the remaining two groups assigned a member of each pair as "more favorable". Of the four favorable contexts (favorable both with regard to the a priore decision as well as with the supportive data from the experiment) three were also judged as being among the top four frequent events, and three of the unfavorable events were judged as being infrequent events. As may be seen from Table VII, the sum of the  $P_{jk}$  for the favorability judgments are dichotomized and are not amenable to a Thurstone type scaling procedure (20).

If we now consider context 1, we note the following:

Context 1 was ranked by the two groups I am and He is respectively  
 3,4 with respect to favorability  
 7,6 with respect to frequency

In other words, context 1 depicts an event which is both favorable and relatively infrequent. If we now compare the mean scores for all the words obtained by Groups I am and He is of Experiment I on context 1 and compare these scores with the mean scores obtained in contexts which are known to be

- a) favorable and frequent
- b) unfavorable and infrequent

we will note that indeed context 1 bears a closer resemblance to the context which is favorable though also frequent, as opposed to the context which is unfavorable though infrequent. One is compelled to infer that the only common attribute of the contexts is that they are both favorable, and therefore it is favorability which is the operative parameter. Table XI has been set up to demonstrate this point.

TABLE XI

Comparison of Contexts 1 and 6  
with other Contexts of  
known Favorability and Frequency Ranks

	<u>Rarely</u>	<u>Seldom</u>	<u>Occasionally</u>	<u>Sometimes</u>	<u>Often</u>	<u>Usually</u>	<u>RANKS</u>
<u>Context 1</u>							<u>Gp. 1 - 2</u>
I am	16.84	20.12	29.16	35.14	73.20	72.34	Fav. 3, 4
He is	17.99	20.93	27.73	35.51	74.94	79.83	Freq. 7, 6
<u>Context 6</u>							
I am	22.51	25.92	29.30	34.55	69.43	69.09	Fav. 5, 5
He is	23.94	31.95	27.19	37.31	73.62	78.64	Freq. 1, 3
<u>Context 8</u>							
I am	20.41	22.58	22.57	26.47	66.01	68.57	Fav. 8, 8
He is	23.13	31.01	25.36	21.44	69.53	74.73	Freq. 8, 8
<u>Context 4</u>							
I am	18.44	23.93	34.09	39.93	75.55	78.14	Fav. 2, 1
He is	24.82	34.16	31.14	34.39	75.68	80.50	Freq. 2, 1

\*\*\*\*\*

## CHAPTER V

## SUMMARY &amp; CONCLUSION

The study presented has demonstrated the positive effect of person contexts and favorability contexts as parameters of judgments of denotative adverbs. The implications of these results have bearing on the general area of psycholinguistics, the practical considerations of psychologists concerned with these adverbs, and are suggestive of extensions in further investigations.

With regard the relevance of the results of this study to those concerned with language and language systems, we should note that whereas the correctness of a term is contingent upon the convention of its usage, any of the adverbs used in this study must be considered correctly denoting any quantity ascribed to it. That is, the conventional usage of the terms employed are so laden with ambiguity that no definitive boundaries of correctness can be established. Of course the possibility remains to explore the conventional usage of a given term for a single individual and thereby describe the correctness of its denotation. However, such was not the intent of this study. Where the concern is the correctness for an entire group of people, there seems to be no evidence for an instance of incorrect usage.

Similarly, when we regard meaning as the selective functioning of a stimulus condition, we must recognize the possibility of the selective function intended by the transmitter of such a message, the selective functioning intended by the receiver of that transmission, and finally, the selective function adopted by convention. We have already noted that we cannot at this time state the selective function intended by

conventional usage. This may indeed be the result from the confusion between the selective functions for which the sender and receiver are in disagreement.

Certainly, in the construction of scales and other instruments of measurement requiring responses based on quantifying adverbs of percent, one should give careful consideration to the propriety of pooling such responses over the entire group. Even if some degree of consistency of usage may be found for a given subject or set of subjects, the heterogeneity of responses for the total group is such as to completely obliterate any meaningful discrimination among these terms. It is indeed likely, that some of the discrepancies reported between self and objective ratings are traceable to effects which are due to person context variations.

Perhaps the logical extension of this study would be to duplicate the procedures described, but with the additional provision of explicit anchors. Both the data from this study as well as other studies cited indicates such an innovation would increase reliability. No prediction is made however, whether it would increase the amount of information transmitted, as well. It would also be quite useful to learn of the effect of these context variations on the performance of individual responses. A subject by subject analysis, requiring more replications with fewer subjects, would possibly provide the complement to this investigation. For a variation on a theme, a fruitful approach may be undertaken by supplying the subject with a numerical percentage and allowing him to respond with an adverb. No isomorphic relationship has been at all implied in the course of the description of this study, nor

indeed rightfully should have been. What has been of paramount interest and importance is the impoverished amount of transmitted information by a group of subjects who undoubtedly can well discriminate among many categories of verbal symbols in other dimensions. The literature abounds with studies indicating the highly developed human machinery which enables man to communicate in the finest of gradations and with a variety of specific expressions. When put to a rigorous test, some members of a class of these symbols did not perform well at all. If this be an isolated failing, constructors of tests and rating scales should note it well. If however, the previous claims were exaggerated, then perhaps some revision of the concepts of ambiguity, correctness of usage, and above all meaning, is quite in order.

## APPENDIX A

QUESTIONNAIRE BOOKLET USED IN EXPERIMENT I

Name \_\_\_\_\_

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

This is an experiment to determine more exactly the meaning of certain words. In the booklet you have before you there are a number of sentences in which one word has been underlined. Each of these underlined words is one which is commonly used to express the frequency or the percentage of time a particular event happens. Read each sentence on your list carefully - and mark beside it the percent of time from 0 to 100% that you think the underlined word refers to. Be sure to consider each sentence a separate case.

PROCEED IN ORDER FROM ITEM #1 TO #48

\*\*\*\*\*

DO NOT REFER BACK TO A PREVIOUS ANSWER

\*\*\*\*\*

BE SURE YOU HAVE ANSWERED ALL QUESTIONS

1. He is occasionally in perfect health
2. He is often lucky
3. He is sometimes intellectually brilliant
4. He is usually content
5. He is rarely stupid
6. He is seldom unlucky
7. He is occasionally intellectually brilliant
8. He is seldom seriously ill
9. He is often bored
10. He is usually unlucky
11. He is seldom content
12. He is rarely in perfect health
13. He is seldom bored
14. He is rarely unlucky
15. He is occasionally seriously ill
16. He is sometimes unlucky
17. He is usually intellectually brilliant
18. He is often stupid
19. He is sometimes bored
20. He is rarely content
21. He is occasionally lucky
22. He is usually stupid
23. He is seldom in perfect health
24. He is sometimes seriously ill
25. He is often content
26. He is sometimes in perfect health
27. He is usually lucky
28. He is occasionally bored

29. He is rarely intellectually brilliant
30. He is often seriously ill
31. He is seldom stupid
32. He is occasionally unlucky
33. He is usually bored
34. He is often in perfect health
35. He is seldom lucky
36. He is sometimes content
37. He is rarely unlucky
38. He is seldom intellectually brilliant
39. He is usually seriously ill
40. He is often intellectually brilliant
41. He is occasionally stupid
42. He is usually in perfect health
43. He is sometimes lucky
44. He is rarely seriously ill
45. He is often unlucky
46. He is occasionally content
47. He is sometimes stupid
48. He is rarely bored

The following appendicial tables, B, C, D, represent the frequency matrices for the various subject groups in Experiment 1. Tables E, F, G, are the proportion matrices which were derived from the preceding frequency matrices.

In each case there are seven (7) columns and eleven (11) rows of data. The first six (6) columns refer to the adverbs "rarely", "seldom", "occasionally", "sometimes", "usually", "often", respectively. The first ten (10) rows refer to response categories 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-89, 90-99, respectively. The seventh column is created by the marginal row totals, and the eleventh row is created by the marginal column totals, as follows:

	Rarely	Seldom	Occasionally	Sometimes	Usually	Often	Total
0 - 9							
10 - 19							
20 - 29							
30 - 39							
40 - 49							
50 - 59							
60 - 69							
70 - 79							
80 - 89							
90 - 99							
Total							

0 - 9  
 10 - 19  
 20 - 29  
 30 - 39  
 40 - 49  
 50 - 59  
 60 - 69  
 70 - 79  
 80 - 89  
 90 - 99  
 Total

The code "1" refers to the group judging the adverbs with the person context "I am".

The code "2" refers to the group judging the adverbs with the person context "He is".

The code "0" refers to the responses of both groups pooled over favorable event contexts, unfavorable event contexts, and finally pooled over all context conditions.

THIS IS FREQ. FAVORABLE MATRIX FOR1

244.0	99.0	23.0	18.0	3.0	5.0	392.0
307.0	268.0	118.0	61.0	7.0	6.0	767.0
122.0	146.0	191.0	120.0	12.0	9.0	600.0
25.0	38.0	106.0	109.0	4.0	11.0	293.0
17.0	25.0	82.0	106.0	9.0	14.0	253.0
15.0	10.0	60.0	142.0	25.0	47.0	299.0
14.0	4.0	18.0	36.0	55.0	76.0	203.0
7.0	17.0	15.0	20.0	134.0	157.0	350.0
15.0	12.0	16.0	14.0	206.0	201.0	464.0
34.0	21.0	11.0	14.0	185.0	114.0	379.0
800.0	640.0	640.0	640.0	640.0	640.0	4000.0

THIS IS FREQ. UNFAVORABLE MATRIX FOR1

165.0	121.0	54.0	48.0	30.0	22.0	440.0
181.0	274.0	163.0	110.0	28.0	29.0	785.0
49.0	104.0	187.0	135.0	23.0	18.0	516.0
12.0	21.0	88.0	120.0	9.0	14.0	264.0
6.0	16.0	60.0	84.0	11.0	20.0	197.0
3.0	7.0	40.0	92.0	23.0	37.0	202.0
2.0	10.0	21.0	26.0	61.0	74.0	194.0
3.0	17.0	12.0	11.0	105.0	143.0	291.0
16.0	28.0	8.0	9.0	193.0	198.0	452.0
43.0	42.0	7.0	5.0	157.0	85.0	339.0
480.0	640.0	640.0	640.0	640.0	640.0	3680.0

THIS IS FREQ. POOLED MATRIX FOR1

409.0	220.0	77.0	66.0	33.0	27.0	832.0
488.0	542.0	281.0	171.0	35.0	35.0	1552.0
171.0	250.0	378.0	255.0	35.0	27.0	1116.0
37.0	59.0	194.0	229.0	13.0	25.0	557.0
23.0	41.0	142.0	190.0	20.0	34.0	450.0
18.0	17.0	100.0	234.0	48.0	84.0	501.0
16.0	14.0	39.0	62.0	116.0	150.0	397.0
10.0	34.0	27.0	31.0	239.0	300.0	641.0
31.0	40.0	24.0	23.0	399.0	399.0	916.0
77.0	63.0	18.0	19.0	342.0	199.0	718.0
1280.0	1280.0	1280.0	1280.0	1280.0	1280.0	7680.0

## THIS IS FREQ. FAVORABLE MATRIX FOR2

221.0	83.0	25.0	24.0	1.0	3.0	357.0
282.0	257.0	114.0	69.0	1.0	6.0	729.0
109.0	132.0	208.0	131.0	4.0	4.0	588.0
24.0	39.0	106.0	117.0	4.0	8.0	298.0
21.0	21.0	91.0	108.0	9.0	29.0	279.0
12.0	7.0	41.0	138.0	24.0	57.0	279.0
5.0	12.0	28.0	23.0	44.0	80.0	192.0
11.0	7.0	6.0	17.0	92.0	125.0	258.0
31.0	36.0	15.0	5.0	226.0	196.0	509.0
84.0	46.0	6.0	8.0	235.0	132.0	511.0
800.0	640.0	640.0	640.0	640.0	640.0	4000.0

## THIS IS FREQ. POOLED MATRIX FOR2

387.0	200.0	86.0	74.0	8.0	8.0	763.0
446.0	517.0	279.0	179.0	7.0	15.0	1443.0
156.0	202.0	387.0	271.0	23.0	22.0	1061.0
27.0	61.0	186.0	220.0	10.0	21.0	525.0
24.0	32.0	158.0	197.0	26.0	55.0	492.0
13.0	12.0	78.0	230.0	58.0	115.0	506.0
5.0	23.0	50.0	41.0	81.0	151.0	351.0
20.0	21.0	21.0	40.0	190.0	242.0	534.0
47.0	84.0	21.0	13.0	431.0	383.0	979.0
155.0	128.0	14.0	15.0	446.0	268.0	1026.0
1280.0	1280.0	1280.0	1280.0	1280.0	1280.0	7680.0

## THIS IS FREQ. UNFAVORABLE MATRIX FOR2

166.0	117.0	61.0	50.0	7.0	5.0	406.0
164.0	260.0	165.0	110.0	6.0	9.0	714.0
47.0	70.0	179.0	140.0	19.0	18.0	473.0
3.0	22.0	80.0	103.0	6.0	13.0	227.0
3.0	11.0	67.0	89.0	17.0	26.0	213.0
1.0	5.0	37.0	92.0	34.0	58.0	227.0
0.	11.0	22.0	18.0	37.0	71.0	159.0
9.0	14.0	15.0	23.0	98.0	117.0	276.0
16.0	48.0	6.0	8.0	205.0	187.0	470.0
71.0	82.0	8.0	7.0	211.0	136.0	515.0
480.0	640.0	640.0	640.0	640.0	640.0	3680.0

THIS IS FREQ. FAVORABLE MATRIX FORO

465.0	182.0	48.0	42.0	4.0	8.0	749.0
589.0	525.0	232.0	130.0	8.0	12.0	1496.0
231.0	278.0	399.0	251.0	16.0	13.0	1188.0
49.0	77.0	212.0	226.0	8.0	19.0	591.0
38.0	46.0	173.0	214.0	18.0	43.0	532.0
27.0	17.0	101.0	280.0	49.0	104.0	578.0
19.0	16.0	46.0	59.0	99.0	156.0	395.0
18.0	24.0	21.0	37.0	226.0	282.0	608.0
46.0	48.0	31.0	19.0	432.0	397.0	973.0
118.0	67.0	17.0	22.0	420.0	246.0	890.0
1600.0	1280.0	1280.0	1280.0	1280.0	1280.0	8000.0

THIS IS FREQ. UNFAVORABLE MATRIX FORO

331.0	238.0	115.0	98.0	37.0	27.0	846.0
345.0	534.0	328.0	220.0	34.0	38.0	1499.0
96.0	174.0	366.0	275.0	42.0	36.0	989.0
15.0	43.0	168.0	223.0	15.0	27.0	491.0
9.0	27.0	127.0	173.0	28.0	46.0	410.0
4.0	12.0	77.0	184.0	57.0	95.0	429.0
2.0	21.0	43.0	44.0	98.0	145.0	353.0
12.0	31.0	27.0	34.0	203.0	260.0	567.0
32.0	76.0	14.0	17.0	398.0	385.0	922.0
114.0	124.0	15.0	12.0	368.0	221.0	854.0
960.0	1280.0	1280.0	1280.0	1280.0	1280.0	7360.0

THIS IS FREQ. POOLED MATRIX FORO

796.0	420.0	163.0	140.0	41.0	35.0	1595.0
934.0	1059.0	560.0	350.0	42.0	50.0	2995.0
327.0	452.0	765.0	526.0	58.0	49.0	2177.0
64.0	120.0	380.0	449.0	23.0	46.0	1082.0
47.0	73.0	300.0	387.0	46.0	89.0	942.0
31.0	29.0	178.0	464.0	106.0	199.0	1007.0
21.0	37.0	89.0	103.0	197.0	301.0	748.0
30.0	55.0	48.0	71.0	429.0	542.0	1175.0
78.0	124.0	45.0	36.0	830.0	782.0	1895.0
232.0	191.0	32.0	34.0	788.0	467.0	1744.0
2560.0	2560.0	2560.0	2560.0	2560.0	2560.0	15360.0

## THIS IS PROP. FAVORABLE MATRIX FOR1

0.305	0.155	0.036	0.028	0.005	0.008	0.098
0.384	0.419	0.184	0.095	0.011	0.009	0.192
0.152	0.228	0.298	0.187	0.019	0.014	0.150
0.031	0.059	0.166	0.170	0.006	0.017	0.073
0.021	0.039	0.128	0.166	0.014	0.022	0.063
0.019	0.016	0.094	0.222	0.039	0.073	0.075
0.017	0.006	0.028	0.056	0.086	0.119	0.051
0.009	0.027	0.023	0.031	0.209	0.245	0.087
0.019	0.019	0.025	0.022	0.322	0.314	0.116
0.042	0.033	0.017	0.022	0.289	0.178	0.095
0.200	0.160	0.160	0.160	0.160	0.160	0.

## THIS IS PROP. UNFAVORABLE MATRIX FOR1

0.344	0.189	0.084	0.075	0.047	0.034	0.120
0.377	0.428	0.255	0.172	0.044	0.045	0.213
0.102	0.162	0.292	0.211	0.036	0.028	0.140
0.025	0.033	0.137	0.187	0.014	0.022	0.072
0.012	0.025	0.094	0.131	0.017	0.031	0.054
0.006	0.011	0.062	0.144	0.036	0.058	0.055
0.004	0.016	0.033	0.041	0.095	0.116	0.053
0.006	0.027	0.019	0.017	0.164	0.223	0.079
0.033	0.044	0.012	0.014	0.302	0.309	0.123
0.090	0.066	0.011	0.008	0.245	0.133	0.092
0.130	0.174	0.174	0.174	0.174	0.174	0.

## THIS IS PROP. POOLED MATRIX FOR1

0.320	0.172	0.060	0.052	0.026	0.021	0.108
0.381	0.423	0.220	0.134	0.027	0.027	0.202
0.134	0.195	0.295	0.199	0.027	0.021	0.145
0.029	0.046	0.152	0.179	0.010	0.020	0.073
0.018	0.032	0.111	0.148	0.016	0.027	0.059
0.014	0.013	0.078	0.183	0.037	0.066	0.065
0.012	0.011	0.030	0.048	0.091	0.117	0.052
0.008	0.027	0.021	0.024	0.187	0.234	0.083
0.024	0.031	0.019	0.018	0.312	0.312	0.119
0.060	0.049	0.014	0.015	0.267	0.155	0.093
0.167	0.167	0.167	0.167	0.167	0.167	0.

## THIS IS PROP. FAVORABLE MATRIX FOR2

0.276	0.130	0.039	0.037	0.002	0.005	0.089
0.352	0.402	0.178	0.108	0.002	0.009	0.182
0.136	0.206	0.325	0.205	0.006	0.006	0.147
0.030	0.061	0.166	0.183	0.006	0.012	0.074
0.026	0.033	0.142	0.169	0.014	0.045	0.070
0.015	0.011	0.064	0.216	0.037	0.089	0.070
0.006	0.019	0.044	0.036	0.069	0.125	0.048
0.014	0.011	0.009	0.027	0.144	0.195	0.064
0.039	0.056	0.023	0.008	0.353	0.306	0.127
0.105	0.072	0.009	0.012	0.367	0.206	0.128
0.200	0.160	0.160	0.160	0.160	0.160	0.

## THIS IS PROP. UNFAVORABLE MATRIX FOR2

0.346	0.183	0.095	0.078	0.011	0.008	0.110
0.342	0.406	0.258	0.172	0.009	0.014	0.194
0.098	0.109	0.280	0.219	0.030	0.028	0.129
0.006	0.034	0.125	0.161	0.009	0.020	0.062
0.006	0.017	0.105	0.139	0.027	0.041	0.058
0.002	0.008	0.058	0.144	0.053	0.091	0.062
0.	0.017	0.034	0.028	0.058	0.111	0.043
0.019	0.022	0.023	0.036	0.153	0.183	0.075
0.033	0.075	0.009	0.012	0.320	0.292	0.128
0.148	0.128	0.012	0.011	0.330	0.212	0.140
0.130	0.174	0.174	0.174	0.174	0.174	0.

## THIS IS PROP. POOLED MATRIX FOR2

0.302	0.156	0.067	0.058	0.006	0.006	0.099
0.348	0.404	0.218	0.140	0.005	0.012	0.188
0.122	0.158	0.302	0.212	0.018	0.017	0.138
0.021	0.048	0.145	0.172	0.008	0.016	0.068
0.019	0.025	0.123	0.154	0.020	0.043	0.064
0.010	0.009	0.061	0.180	0.045	0.090	0.066
0.004	0.018	0.039	0.032	0.063	0.118	0.046
0.016	0.016	0.016	0.031	0.148	0.189	0.070
0.037	0.066	0.016	0.010	0.337	0.299	0.127
0.121	0.100	0.011	0.012	0.348	0.209	0.134
0.167	0.167	0.167	0.167	0.167	0.167	0.

## THIS IS PROP. FAVORABLE MATRIX FORO

0.291	0.142	0.037	0.033	0.003	0.006	0.094
0.368	0.410	0.181	0.102	0.006	0.009	0.187
0.144	0.217	0.312	0.196	0.012	0.010	0.148
0.031	0.060	0.166	0.177	0.006	0.015	0.074
0.024	0.036	0.135	0.167	0.014	0.034	0.066
0.017	0.013	0.079	0.219	0.038	0.081	0.072
0.012	0.012	0.036	0.046	0.077	0.122	0.049
0.011	0.019	0.016	0.029	0.177	0.220	0.076
0.029	0.037	0.024	0.015	0.337	0.310	0.122
0.074	0.052	0.013	0.017	0.328	0.192	0.111
0.200	0.160	0.160	0.160	0.160	0.160	0.

## THIS IS PROP. UNFAVORABLE MATRIX FORO

0.345	0.186	0.090	0.077	0.029	0.021	0.115
0.359	0.417	0.256	0.172	0.027	0.030	0.204
0.100	0.136	0.286	0.215	0.033	0.028	0.134
0.016	0.034	0.131	0.174	0.012	0.021	0.067
0.009	0.021	0.099	0.135	0.022	0.036	0.056
0.004	0.009	0.060	0.144	0.045	0.074	0.058
0.002	0.016	0.034	0.034	0.077	0.113	0.048
0.012	0.024	0.021	0.027	0.159	0.203	0.077
0.033	0.059	0.011	0.013	0.311	0.301	0.125
0.119	0.097	0.012	0.009	0.287	0.173	0.116
0.130	0.174	0.174	0.174	0.174	0.174	0.

## THIS IS PROP. POOLED MATRIX FORO

0.311	0.164	0.064	0.055	0.016	0.014	0.104
0.365	0.414	0.219	0.137	0.016	0.020	0.195
0.128	0.177	0.299	0.205	0.023	0.019	0.142
0.025	0.047	0.148	0.175	0.009	0.018	0.070
0.018	0.029	0.117	0.151	0.018	0.035	0.061
0.012	0.011	0.070	0.181	0.041	0.078	0.066
0.008	0.014	0.035	0.040	0.077	0.118	0.049
0.012	0.021	0.019	0.028	0.168	0.212	0.076
0.030	0.048	0.018	0.014	0.324	0.305	0.123
0.091	0.075	0.012	0.013	0.308	0.182	0.114
0.167	0.167	0.167	0.167	0.167	0.167	0.

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THE EFFECT OF CERTAIN CONTEXTS ON THE  
DENOTATIVE MEANING OF SOME ADVERBS OF  
FREQUENCY

Abstract of a Dissertation

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requirements for the degree  
of Doctor of Philosophy

BOSTON UNIVERSITY GRADUATE SCHOOL

by

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## ABSTRACT

The present study is concerned with a problem that is essentially in the area of psycholinguistics. The linguistic aspect of the problem concerns the concept of "meaning". It is necessary to review the criteria upon which this concept is defined and applied to semiotic material in general, and to denotative adverbs in particular. Of particular interest to psychology is quantifiable representation of this concept as well as an investigation of several parameters which may affect the judgment of the meaning of a particular adverb. The meaning attributed to any denotative adverb has been generally accepted as the model or average judgment of the population concerning the denoted referent, i.e., the meaning is determined by the convention of its usage with respect to denoting a particular segment of the underlying referent dimension. It is, of course, vital to ascertain a) what this average, conventional judgment is, and b) whether the conventional meaning attributed by the pooled judgments of a group is in fact a valid index for establishing word meaning. The results of this investigation have relevant implications for any situation which requires the use of quantity adverbs as responses, and in which the total of such responses are pooled and tallied for a given group to subsequently serve as the basis for further assertions. The underlying assumption made in such situations is that a group (necessarily implying the individual subjects comprising the group) is in relative agreement on the meaning of a particular word. The present study has investigated the nature of the precision with which any particular word is used as well as establishing the nature of the discriminability among several words, each of which denotes relative frequency.

The present study has accepted the definition of meaning as formulated by Mackay which he proposed as an appropriate consideration for an analysis of information transmission. This formulation avoids the problems encountered in many of the early studies of word meaning which concerned themselves with behavioral or physiological correlates of a particular word. Later investigations focused on the measurement of word meaning via a series of scales upon which a given word was to be rated. Several classes of denotative words lend themselves to more direct measurement of meaning by employing an absolute judgment task of the particular word, where the word is judged on its respective referent dimension. Simpson reported the results of such an investigation, as did Cohen and Hansel. Helson used the same approach in the judgment of denotative adjectives which he presented in various numerical backgrounds or contexts which were modified by the adjective, e.g., "some" constitutes how many people when considering a total population of X people. He interpreted his results as supporting a level of adaptation hypothesis, in that the absolute judgment of the adjective was modified by the background condition.

The present study required the absolute judgment of six adverbs of frequency, viz., rarely, seldom, occasionally, sometimes, usually, often, which were presented in two classes of context conditions; event context and the person context. The event context was defined by the favorability or unfavorability of the event which was modified by an adverb, e.g., rarely stupid, stupid is an unfavorable event. The person context was defined by the personal pronoun which introduced each sentence in which the adverb and event context appeared, e.g., I am.. vs. He is.. . Each

word was presented in each context event. For one group, N-159, each sentence was always introduced by the first person personal pronoun, and for another group, N-161, each sentence was always introduced by the third person personal pronoun. A control group, N-200, was asked to judge the adverbs in the absence of any contextual conditions.

An additional group of 200 subjects were recruited for a series of paired comparison judgments of the event contexts on the dimension of favorability, and a companion group of 200 subjects judged the events on the dimension of relative frequency. All subjects were recruited from the General Psychology Classes at Boston University.

The results of three way factorial analysis of variance design indicated:

- a) the person context and the adverbs were significant main effects
- b) the person context by words, and the event context by words were significant interaction terms.

The variability in the responses was strikingly high. This was further evidenced in the results of an analysis of the amount of transmitted information for the various groups. In no case was more than one bit of information transmitted, which indicates that due to extreme response equivocation, no more than 2 response categories could be used without error. The implications of the results indicated that the conventional meaning of these adverbs is either

- a) the inappropriate tool of measurement of word meaning,

or

- b) the adverb's meaning is in fact broad and inherent with the variability due to individual differences.

Further, the role of favorability of the event and the role of the person context were noted as parameters of the absolute judgment situation. The results suggest further investigations of the role of the context conditions as well as a more detailed description of the effects of the pooled responses in contributing to the variability.



David Isaac Mostofsky was born in Boston, Massachusetts on September 19, 1931 to Benjamin and Leah (Caplan) Mostofsky. After attending the Boston Public School system he received his B. A. from Yeshiva College, New York in June 1953. He was ordained by the Yeshiva University Theological Seminary in June 1955. In 1956 he matriculated at Boston University where he was awarded the A. M. degree in June 1957. Since then continued as doctoral candidate in the Experimental Psychology program. While at Boston University he was an assistant (1956-1957) and also held a teaching fellowship (1957-1959). In the summer of 1959\* he was awarded a National Science Foundation Fellowship for Teaching Assistants.