



*VERBAL LEARNING*  
*and*  
*VERBAL BEHAVIOR*

Edited by

CHARLES N. COFER

with the assistance of BARBARA S. MUSGRAVE

PROCEEDINGS OF A CONFERENCE SPONSORED BY  
THE OFFICE OF NAVAL RESEARCH AND NEW YORK UNIVERSITY

PARTICIPANTS

Weston A. Bousfield	Charles E. Osgood
James Deese	Leo Postman
Albert E. Goss	Wallace A. Russell
James J. Jenkins	Denzel D. Smith
George Mandler	Benton J. Underwood
Arthur W. Melton	Barbara S. Musgrave
Clyde E. Noble	Charles N. Cofer

McGRAW-HILL BOOK COMPANY, INC.

New York      Toronto      London

1961

## VERBAL LEARNING AND VERBAL BEHAVIOR

Copyright © 1961 by the McGraw-Hill Book Company, Inc. Printed in the United States of America. All rights reserved. This book, or parts thereof, may not be reproduced in any form without permission of the publishers. *Library of Congress Catalog Card Number 61-8651*

11550

4 5 6 7 8 9 - M P - 9 8 7 6

E 701

教师阅览室

7996196

VERBAL LEARNING  
AND  
VERBAL BEHAVIOR

PROCEEDINGS OF A CONFERENCE SPONSORED BY  
THE OFFICE OF NAVAL RESEARCH AND NEW YORK UNIVERSITY



T7996196

# McGRAW-HILL SERIES IN PSYCHOLOGY

HARRY F. HARLOW, *Consulting Editor*

---

BEACH, HEBB, MORGAN, AND NISSEN · The Neuropsychology of Lashley  
BERKOWITZ · Aggression: A Social Psychological Analysis  
VON BÉKÉSY · Experiments in Hearing  
BERLYNE · Conflict, Arousal, and Curiosity  
BLUM · Psychoanalytic Theories of Personality  
BROWN · The Motivation of Behavior  
BROWN · The Psychodynamics of Abnormal Behavior  
BROWN AND GHISELLI · Scientific Method in Psychology  
BUCKNER AND McGRATH · Vigilance: A Symposium  
CATTELL · Personality  
COFER · Verbal Learning and Verbal Behavior  
COFER AND MUSGRAVE · Verbal Behavior and Learning: Problems and Processes  
CRAFTS, SCHNEIRLA, ROBINSON, AND GILBERT · Recent Experiments in Psychology  
DEESE · The Psychology of Learning  
DOLLARD AND MILLER · Personality and Psychotherapy  
DORCUS AND JONES · Handbook of Employee Selection  
ELLIS · Handbook of Mental Deficiency  
FERGUSON · Personality Measurement  
FERGUSON · Statistical Analysis in Psychology and Education  
GHISELLI · Theory of Psychological Measurements  
GHISELLI AND BROWN · Personnel and Industrial Psychology  
GILMER · Industrial Psychology  
GRAY · Psychology Applied to Human Affairs  
GUILFORD · Fundamental Statistics in Psychology and Education  
GUILFORD · Personality  
GUILFORD · Psychometric Methods  
HAIRE · Psychology in Management  
HIRSH · The Measurement of Hearing  
HURLOCK · Adolescent Development  
HURLOCK · Child Development  
HURLOCK · Developmental Psychology  
KARN AND GILMER · Readings in Industrial and Business Psychology  
KRECH AND CRUTCHFIELD · Theory and Problems of Social Psychology  
LAZARUS · Adjustment and Personality  
LEWIN · A Dynamic Theory of Personality  
LEWIN · Principles of Topological Psychology  
LEWIS · Quantitative Methods in Psychology  
MAIER AND SCHNEIRLA · Principles of Animal Psychology  
MARX AND HILLIX · Systems and Theories in Psychology  
MILLER · Language and Communication  
MISIAK AND STAUDT · Catholics in Psychology: A Historical Survey  
MOORE · Psychology for Business and Industry  
MORGAN AND STELLAR · Physiological Psychology  
PAGE · Abnormal Psychology  
RETHLINGSHAFFER · Motivation as Related to Personality  
REYMERT · Feelings and Emotions  
SEASHORE · Psychology of Music  
SHAFFER AND LAZARUS · Fundamental Concepts in Clinical Psychology  
SIEGEL · Nonparametric Statistics: For the Behavioral Sciences  
STAGNER · Psychology of Personality  
TOWNSEND · Introduction to Experimental Method  
VINACKE · The Psychology of Thinking  
WALLEN · Clinical Psychology: The Study of Persons  
WATERS, RETHLINGSHAFFER, AND CALDWELL · Principles of Comparative Psychology  
WINER · Statistical Principles in Experimental Design  
ZUBEK AND SOLBERG · Human Development

John F. Dashiell was Consulting Editor of this series from its inception in 1931 until January 1, 1950. Clifford T. Morgan was Consulting Editor of this series from January 1, 1950 until January 1, 1959.

## PREFACE

In this volume are recorded the proceedings of a Conference on Verbal Learning and Verbal Behavior held in the fall of 1959 under the auspices of New York University and the U.S. Office of Naval Research. By way of preface to these proceedings, I wish to report on how the conference developed, what its plan of operation was, how the proceedings were prepared and what they represent, and to acknowledge the fact that the aid of several individuals and organizations was indispensable to the execution of the conference plan.

In the fall of 1958, when I was at the University of Maryland, Dr. D. D. Smith and I agreed that a conference in the general area of verbal learning was desirable. A great deal of research has gone on in verbal learning—75 years' worth—and the Office of Naval Research, as well as other agencies, has had an important supporting role in a good deal of it, under its policy of encouraging basic research. Dr. Smith and I made up a list of people whom we felt to be particularly active in the traditional field of verbal learning, most of whom were current or recent ONR contractors. We made these persons a committee, and from that time on these persons participated in the development of the plans for the conference program and participating personnel. Smith and I had agreed that the total conference group would be small, that the papers would consider problems of theory, issue, and method rather than be direct research reports, and that a series of papers on important topics would be prepared and distributed prior to the meeting.

With these agreements in mind, I wrote to the following committee members: James Deese, A. E. Goss, G. A. Miller, C. E. Noble, Leo Postman, and B. J. Underwood. They were apprised of the general plans which Smith and I had developed, and several topics for the conference were proposed. Nominations of potential participants were solicited. The response was enthusiastic. With two more exchanges of correspondence, the conference topics were settled, and the other participants were agreed upon. Invitations and assignments were then sent out to these other participants. One person, because of ill health, declined to participate. Later, two other people, one of them G. A. Miller, had to withdraw because of unanticipated conflicts with other commitments. A little further adjustment of topics and assignments was therefore necessary.

As planned, the seven assigned papers were prepared and distributed

ahead of the conference; therefore, none was read or otherwise presented at the meeting. Each paper had a discussant, and the conference procedure was that a given discussant presided over the session concerned with the paper (usually not without interruption) and then led a general discussion. Discussion sessions lasted from two to three hours and were lively.

The proceedings which follow consist of the seven papers prepared ahead of the meeting, together with a paper prepared by the discussant of each paper. Except for minor editing and, in some cases, the addition of footnotes, the prepared papers are in the form in which they appeared at the conference. Some of the discussants prepared their papers before the meeting, and these papers are presented here with but minor changes. Other discussants wrote their papers after the meeting. Following each prepared paper and discussant's paper, there is a summary of the conference discussion. Dr. Barbara Musgrave, now of Smith College, served as the conference recorder, and these summaries were prepared from her notes by the writer, after conferences with Dr. Musgrave. These summaries do not represent in any way a verbatim account of the discussion, or even an accurate portrayal of the sequence in which items were talked about. They represent an attempt to outline the major issues that came up and what was said about each one. After the preparation of these summaries the participants reviewed them. Responsibility for their form and for errors they contain, however, must remain the writer's.

The remaining sections of the proceedings, the Introduction and the Commentary, were prepared by the writer from his own notes and Dr. Musgrave's notes and from his remarks at the final session of the conference, at which he attempted a summary. The references cited by each writer and discussant follow their papers; certain additional references were mentioned in the discussions, and these have been listed following the summary of each discussion.

It remains to acknowledge the role of those who made the meeting possible and who made it function so effortlessly. The conference was jointly sponsored by the Psychological Sciences Division of the Office of Naval Research, U.S. Navy Department, and the Department of Psychology, New York University, and was partially supported under Contract No. Nonr-285(47). Without Barbara Musgrave's notes certain portions of these proceedings would not exist.

Mr. Aaron Finesot, Director of the Office of Special Services to Business and Industry, New York University, was very helpful in making available the university's Frank Jay Gould House as a meeting and living place. We owe him our gratitude. Mr. Carol E. Spette, Resident Manager of Gould House, his wife, and his excellent staff provided meals and lodgings in such an effortless way that one hardly knew the staff was there. To them also our thanks are extended.

*Charles N. Cofer*

# CONTENTS

PREFACE . . . . .	v
1. Introduction and Summary . . . . .	1
2. From the Isolated Verbal Unit to Connected Discourse, <i>James Deese</i> . . . . .	11
Comments on Professor Deese's Paper, <i>Charles N. Cofer</i> . . . . .	31
SUMMARY OF CONFERENCE DISCUSSION . . . . .	38
3. Acquisition and Use of Conceptual Schemes, <i>Albert E. Goss</i> . . . . .	42
Comments on Professor Goss's Paper, <i>James J. Jenkins</i> . . . . .	69
SUMMARY OF CONFERENCE DISCUSSION . . . . .	75
4. The Problem of Meaning in Verbal Learning, <i>Weston A. Bousfield</i> . . . . .	81
Comments on Professor Bousfield's Paper, <i>Charles E. Osgood</i> . . . . .	91
SUMMARY OF CONFERENCE DISCUSSION . . . . .	106
5. Assessment versus Experimental Acquisition of Verbal Habits, <i>Wallace A. Russell</i> . . . . .	110
Comments on Professor Russell's Paper, <i>George Mandler</i> . . . . .	123
SUMMARY OF CONFERENCE DISCUSSION . . . . .	128
6. Verbal Learning and Individual Differences, <i>Clyde E. Noble</i> . . . . .	132
Comments on Professor Noble's Paper, <i>James J. Jenkins</i> . . . . .	146
SUMMARY OF CONFERENCE DISCUSSION . . . . .	150
7. The Present Status of Interference Theory, <i>Leo Postman</i> . . . . .	152
Comments on Professor Postman's Paper, <i>Arthur W. Melton</i> . . . . .	179
SUMMARY OF CONFERENCE DISCUSSION . . . . .	192
8. An Evaluation of the Gibson Theory of Verbal Learning, <i>Benton J. Underwood</i> . . . . .	197
Comments on Professor Underwood's Paper, <i>Clyde E. Noble</i> . . . . .	217
SUMMARY OF CONFERENCE DISCUSSION . . . . .	222
9. Commentary . . . . .	224
ADDENDUM . . . . .	229
INDEX . . . . .	231

## Chapter 1

### INTRODUCTION AND SUMMARY

The experimental study of memory was initiated by Hermann Ebbinghaus, whose book *On Memory* was published in 1885. Ebbinghaus invented the nonsense syllable, defined by him as two consonants separated by a vowel which did not form a meaningful word. Using himself as his subject, Ebbinghaus learned, serially, list after list of such syllables, studying a number of variables whose effect on the processes of acquisition and retention of the lists he delineated. He made some comparisons between nonsense-syllable learning and the learning of poetry, but Ebbinghaus's chief concern was to study the basic processes of learning and retention. He thought that this study could be accomplished best if the various complexities which meaningful words and organizations of meaningful words introduce were eliminated. And he believed that the nonsense syllable eliminated these complexities.

In the ensuing years, verbal learning, a term which designates the kind of study which Ebbinghaus carried out, has received the attention of innumerable investigators, and the papers published on problems of verbal learning number in the thousands. Many variations in technique and materials have been introduced. For example, the method of paired-associates learning is used as frequently as the method of serial anticipation, which Ebbinghaus employed, and lists of meaningful words are approaching the popularity of lists of nonsense syllables. A host of variables has been added to those which Ebbinghaus considered, and experiments have been designed to explicate transfer and interference effects within and between lists as well as other problems beyond the range of Ebbinghaus's efforts. Nevertheless, all of this work bears Ebbinghaus's stamp: it has concerned the learning and retention of lists of discrete items in an effort to describe and to explain basic associative processes and the conditions of which they are a function. The books by McGeoch (1942) and McGeoch and Irion (1952) represent this work well, up to the time at which they were published.

The Ebbinghaus tradition, then, has focused attention on associative processes, studied by means of the rote learning of verbal materials. It has tended to ignore or to neglect verbal characteristics and skills which a person's natural language has provided him and which may interact

with the task set for him in the laboratory. Further, it has tended not to examine processes of "higher order" than elementary associations. Experimental controls have been carefully devised to minimize as much as possible the contribution to list learning of factors which might complicate the formation of independent or discrete associations, such as grouping, rhythm, mnemonic devices, and relationships among individual units.

There have, of course, been objections to this tradition from time to time. Almost thirty years ago, Bartlett (1932) denied that the nonsense syllable eliminates meaning as a factor, and he went on to carry out and to describe investigations whose stimuli, responses, and procedures were very different from those of studies in the Ebbinghaus tradition. Recent writers who have stressed coding or organizing operations (cf. Miller, 1956) seem more in Bartlett's tradition than in Ebbinghaus's, although they may have started from still different viewpoints, such as information theory. The description of the natural language characteristics of people and of languages themselves is having a growing influence on several aspects of psychological inquiry (cf. Carroll, 1953; Miller, 1951; Osgood and Sebeok, 1954), and that such characteristics have relevance to the study of verbal learning is abundantly demonstrated in the present conference (cf. also Underwood and Postman, 1960). This latter trend is the study of verbal behavior. Although the acquisition of first and of second languages is an important problem in the study of verbal behavior, the emphasis here is not so much on language acquisition as it is on description of the verbal behaviors which the individual has already acquired, how much and by what means they may be altered, and how these behaviors influence his relations with the world and his functioning in other areas, like verbal learning. On this basis, then, verbal learning and verbal behavior can be distinguished, although the two have much in common and interact.

In the present conference, all of these trends or traditions are represented. Although no participant can be classified simply, the work of some of them has fallen mainly in the Ebbinghaus tradition and that of others in the study of verbal behavior. Several have been interested in coding or organizing processes. The topics, too, represent these three interests. The papers by Deese and Goss are pertinent to coding and organizing processes, those by Deese, Bousfield, and Russell to verbal behavior, and those by Postman, Underwood, and Noble to verbal learning. In its concern for individual differences, however, Noble's paper departs from the traditional interests of students of verbal learning.

There follows an attempt to epitomize this conference. This will be done through a brief summary of each of the prepared papers and of

the discussion which it engendered. In the Commentary, at the end of the volume, a statement is made of the more outstanding trends, agreements and disagreements, issues of method and of definition, and deficiencies of this conference.

*James Deese*

*From the Isolated Verbal Unit to Connected Discourse*

Professor Deese questions the idea that any verbal unit can be considered as an isolated one. However, he does suggest that the study of diverse kinds of material can contribute valuable information through the kinds of contingent relationships among segments which different materials display. His approach is essentially a correlational one; i.e., normative data are used to predict the individual's behavior in some situation in which restrictions on the behavior are imposed. Deese argues that the nonsense syllable is not a desirable unit because it involves certain complexities not found in meaningful words. The word, as a unit, encounters definitional problems which, however, he considers of little practical importance. Deese then describes studies in which the method has been a single presentation of a list of words followed by an immediate, free recall. His paper reviews three factors often presumed to influence the recall of a list of words.

The first factor is interitem associative strength. Lists of words which have a high index of interitem associative strength (i.e., words in the list are frequent associates of other words in the list) are more readily recalled than lists with low interitem associative strength. Intrusions of other (nonlist) words into the recall of the list are also predictable on this associative basis. Deese conceives the recall of such lists as involving the actual retention of but a few words, and the "recall" of additional words through "guessing" or "constructing" them by means of association to the words actually retained. Deese saw no reason to suggest that the subject edits or selects among his associations in this process.

Second, Deese presented evidence that leads him to doubt that word frequency is a factor which is related to the free recall of words. Once a word is encoded or well integrated, it should be readily recalled, no matter what its frequency of occurrence in the language. For example, *dog* and *giraffe* differ widely in frequency of usage, but if they are well encoded they should not differ in recallability.

The third factor is sequential dependencies among words. Recall of higher approximations to the English language is better than it is for lower approximations, not because more words are actually recalled from the higher approximations, but because the subject's knowledge of

English syntax allows him to guess or to construct the words which must be there in the case of the higher approximations. His recall score would be elevated by correct guesses.

In summary, Deese conceives the recall of lists of words as chiefly determined by interitem associative factors and by sequential features imparted to the material either by a text itself or by the subject. Both factors permit the subject to construct or to guess much of his performance in recall. In addition, the subject will tend to use the more frequently occurring words which are highly available to him. Recall of connected discourse can be very probably accounted for by these same factors, although certain additional complexities will arise.

In the discussion, criticisms were addressed to Deese's guessing-or-construction hypothesis, on the basis that importations do not appear frequently in delayed recalls and the subject's immediate recall of a list is usually only a fraction of the number of words the list contained. If the subject were guessing, it seems that he would produce more words than he does, including importations or intrusions. Further, the word *guessing* was criticized as not being descriptive of what the subject is probably doing. (In revising his paper, Deese tended to substitute *constructing* for *guessing*.) Deese's attack on the word-frequency variable was also questioned, and several kinds of evidence were advanced to suggest that it influences verbal behavior. Also mentioned was the need for better associative norms than those available, and the problem of contextual influences on associative responses was emphasized.

Albert E. Goss

### *Acquisition and Use of Conceptual Schemes*

Coding and organizing processes were mentioned in the Introduction, and Professor Goss's paper is concerned with such processes under the term *conceptual schemes*. His paper reviews some of the historical antecedents to current interest in conceptual schemes, citing the work of Bartlett and of the Gestalt psychologists and that of theorists who have stressed the role of mediating responses and their consequent stimuli. Goss's paper then deals with the definition of such conceptual schemes, of which he gives several examples, and the possible ways in which such schemes are learned. He also developed, theoretically, the ways in which conceptual schemes may function in the further learning of stimulus-response relationships and how the conceptual schemes may themselves be modified. Central to his theoretical analysis as well as to his treatment of several examples, including an analysis of the act of writing something, is the idea that conceptual schemes have their value because they involve verbal labeling responses which serve a mediating role; in some instances they provide for transfer from one

situation to another, and in other instances they serve the function of discrimination.

In the discussion which followed Goss's paper, perhaps the major point among those raised concerned the role of labeling in the use of grammatical rules in speaking and writing. There are really two points here. One is that native speakers and writers of a language achieve, at a very early age, considerable skill in using the grammar of the language and that they are able to apply the grammar correctly to words and phrases which they have not heard or seen before. The other point is that such usage goes on in the absence of explicit knowledge of the grammatical schemes themselves or of explicit (or implicit) labeling responses such as those which Goss suggests, particularly in many formal writing tasks. There was a good deal of agreement that simple associative processes alone cannot account for these phenomena of grammatical usage, but there was sharp disagreement as to how much language behavior non-associative mechanisms must account for and as to the nature of such mechanisms. It seems evident that the participants were differentially persuaded that the language of native speakers and writers is skillful, grammatical, and flexible, on the one hand, and repetitive, ungrammatical, and learned by rote, on the other. While some data exist concerning these points, it was agreed that much more study is needed. Language learning in the young child was seen as an area critically requiring study in order that knowledge of the acquisition of conceptual schemes or grammar be accumulated.

*Weston A. Bousfield*

*The Problem of Meaning in Verbal Learning*

Professor Bousfield's paper suggests that meaning is not a useful concept if by meaning is meant something other than verbal associations. His paper includes a number of demonstrations of the power which measures of association have in predicting transfer and generalization in verbal problems, together with a theoretical statement of his viewpoint and an analysis of the mechanisms involved in Osgood's semantic differential in his terms. Since it is Bousfield's contention that implicit or explicit verbal associative responses mediate transfer and generalization and function in the semantic differential, he sees no reason to invoke any other interpretation of meaning.

The discussion of this paper included attempts to clarify the theoretical differences between Bousfield and Osgood and to explore more fully the implications of the models. Data relevant to the adequacy of the models were reviewed. Problems he sees in Bousfield's model were outlined by Osgood. A major problem is that Bousfield's model, dependent as it is on verbal responses, cannot explain how the preverbal child

learns meanings. On the other hand, successful predictions of verbal behavior in various situations support Bousfield's conception. There was considerable discussion of the adequacy of evidence which Osgood marshaled as supporting the necessity for a conception like the one that he has developed.

*Wallace A. Russell*

*Assessment vs. Experimental Acquisition of Verbal Habits*

The characteristics and processes of the natural language have an intrinsic interest and importance in themselves, and their significance further arises from the influences they may have on other psychological processes. Professor Russell points out that there are two strategies which have guided research in relation to these points. One is to assess the status of language characteristics by test procedures, e.g., by word-association tests, and then to examine experimentally either the influence of other variables on such test performances or the influence of characteristics ascertained by tests on processes like learning or perception in a laboratory situation. The other strategy is to attempt to build into the subject, through experimental operations, the kind of verbal characteristics in which the experimenter is interested and then to test, again experimentally, the influence of other variables on these characteristics or the influence of these characteristics on other processes. Two major questions arise. First, are the habits or characteristics developed in the laboratory comparable to characteristics which the natural language possesses? Second, can all significant language functions be simulated experimentally? Concerning question one, error in the estimation of individual characteristics by means of data from normative samples is always probable, and there is the problem of reliability in conjunction with efforts to obtain estimates of his characteristics from the experimental subject himself. Of more systematic importance, however, is the issue of validity of tests as indicators of the constructs in which the experimenter is interested. Russell gives several reasons for believing that test-inferred and experimentally introduced processes may not be the same thing. In answering his second question, Russell indicated that an affirmative answer is not yet possible, but he further suggested that modifications of and innovations in laboratory techniques offer some hope that many language functions, at least, can be studied appropriately in the laboratory.

In the discussion, questions arose as to the equivalence of measures which presumably get at the same variable, like different measures of association and of verbal fluency, and there was a note of considerable caution concerning the assumption of the identity of or the correspondence between experimentally established and test-inferred constructs.

Much discussion was devoted to the Mowrer (1954) paradigm for the acquisition of meaning and to the question of whether the acquisition of associations requires more than one trial. Basic to both of these issues was the conviction on the part of several participants that syntactical factors are not adequately taken account of in the Mowrer paradigm and that such factors may account for the apparent slowness in the acquisition of associations when several associations are acquired simultaneously in list learning.

*Clyde E. Noble*

*Verbal Learning and Individual Differences*

Professor Noble argued that correlational and experimental approaches to the study of verbal behavior are complementary. He summarized data consistent with the proposition that rate of acquisition in selective learning tasks is a positive function of initial ability level. Specific relationships between aspects of verbal learning and individual differences were brought out. Noble described Hull's approach to the treatment of the individual-difference factor, and, although he is in sympathy with this orientation to the problem, he indicated a number of problems which must be worked out before its adequacy can be evaluated. Problems of method that must be solved, including that of standardization, were illustrated by the task of establishing the association values of nonsense syllables and by the need for improved measures of personality and motivational characteristics. If steps are taken along these lines of method, a more complete integration of verbal learning and individual differences can be accomplished than is possible at the present time.

A point made in the discussion was that constructs presumably measured by test procedures are often unclear. It is possible that the abilities involved in verbal learning are multiple and not highly intercorrelated. There may be three kinds of learning in verbal learning: stimulus integration, response integration, and the association of stimuli and responses.

It was emphasized that it is not enough just to decide to study individual differences. There must be some basis for deciding with what individual-difference factor one will begin. Individual differences in the performance of individuals, as measured by various indices provided by learning tasks, and individual differences present before learning starts should be distinguished. The former can be related to the learning process itself. Some investigators find that prior measures of individual differences interact with measures of learning; others do not.

Some attention was paid to the distinction between stimulus-response laws (S-R laws) and response-response laws (R-R laws). The group had difficulty in making a clear distinction between these types of laws.

Leo Postman

*The Present Status of Interference Theory*

Professor Postman's paper is a reanalysis of the theory that failures of recall occur because of competition of responses at the time of recall. One postulate is the independence hypothesis. In the retroactive-interference paradigm A-B, A-C, for example, the A-B list was considered not to be affected during the learning of the A-C list; i.e., the strengths of the associations in the A-B list were independent of the A-C list. At recall, competition of response would explain forgetting; when the responses B and C were of equal strength, failures in recall would occur, but when the strength of C exceeded that of B, B could not be given and so would be deemed "forgotten." Recent evidence suggests that the independence hypothesis is incorrect and that there is actual unlearning or extinction of the first-list responses (B) during the learning of the second list (A-C); A-C is the interpolated list of a retroaction design. Recovery of the A-B associations may occur, and then there will be competition between B and C. In the case of similarity between responses (B and B') of the two lists, however, the first-list response may serve as a mediator between A and B' (the second list). Such mediation is also inconsistent with the independence hypothesis. In this case, facilitation of second-list learning may result. Differentiation of the two lists also is important to accuracy of recall, and this differentiation decreases as time after learning increases. Hence, retroactive interference should increase with time in the A-B, A-B' paradigm, an effect that is less marked in the A-B, A-C case.

Postman also brought out evidence for other factors in forgetting, like specific and generalized response competition. Specific competition is that between particular responses associated with the same or similar stimuli. Generalized response competition is the subject's tendency to make responses from the last list practiced. This should be greater in retroaction than in proaction. Other analyses concerning unlearning, mediation, list discrimination, and specific and generalized response competition brought out differences that should be expected between retroactive and proactive interference, from manipulation of temporal intervals, and from different values of other parameters of the learning situation.

Since proactive interference now seems to be the major factor in long-term forgetting, Postman devoted attention to factors which may act proactively on laboratory learning tasks. He analyzed and presented evidence concerning two such factors, letter sequences and unit (i.e., word) sequences which have their sources in the natural language. They act to interfere with the retention of tasks learned in the laboratory.

Discussion of this paper focused on several issues. One was whether interference can explain all forgetting. Is there "deterioration" of the

memory trace in time, independently of interference? There was discussion of the learning of pairs of words which have differing degrees of prior associative linkages, as determined from associative norms, but which differ little in their difficulty of learning. Context in the process of recall, it was agreed, is an extremely important variable and deserves much more study than it has had.

*Benton J. Underwood*

*An Evaluation of the Gibson Theory of Verbal Learning*

In 1940, Eleanor J. Gibson published an analysis of verbal learning problems in terms of the concepts of generalization and differentiation, concepts derived from work on the conditioned response. As Professor Underwood observes in his paper, the theory was an influential one. Underwood's discussion is devoted to the question whether the theory has continued usefulness in the present. After outlining Gibson's major ideas and stating what now seem to have been defects in the original statement of the theory, Underwood examines the application of Gibson's theory to the problem of learning and retaining a single list and to the problem of transfer. In the former case he finds the theory holds in certain respects when geometric forms or nonsense syllables are used as stimuli but not when words are used as stimuli. Whether data on errors in list learning support the theory depends on how errors are measured, and certain predictions concerning recall in relation to intra-list similarity of stimuli are not supported. Underwood finds the theory to be valid for only a limited range of transfer phenomena and probably to be invalid for other transfer phenomena. A number of developments in the analysis of verbal learning have followed directions to which the theory is not relevant and concerning which it offers little help. In general, Underwood concludes that Gibson's theory now has little usefulness. Only a thorough revision could bring it up to date and give it viability.

In the discussion, there seemed to be no major disagreement with many of Underwood's evaluations of Gibson's theory, and perhaps because of this, the topics discussed diverged from specific concern with the theory. The concept of similarity was discussed in some detail, in an attempt to clarify its meaning, and there was an extensive discussion of the topics of meaningfulness, stimulus familiarity, and response integration, all in the context of relevant experimental work.

#### REFERENCES

- Bartlett, F. G. (1932) *Remembering: A study in experimental and social psychology*. New York: Cambridge.
- Carroll, J. G. (1953) *The study of language*. Cambridge, Mass.: Harvard University Press.