

VERBAL BEHAVIOR

by
B. F. Skinner

William James Lectures
Harvard University
1948

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Preface

In 1930, the Harvard departments of psychology and philosophy began sponsoring an endowed lecture series in honor of William James and continued to do so at irregular intervals for nearly 60 years. By the time Skinner was invited to give the lectures in 1947, the prestige of the engagement had been established by such illustrious speakers as John Dewey, Wolfgang Köhler, Edward Thorndike, and Bertrand Russell, and there can be no doubt that Skinner was aware that his reputation would rest upon his performance. His lectures were evidently effective, for he was soon invited to join the faculty at Harvard, where he was to remain for the rest of his career. The text of those lectures, possibly somewhat edited and modified by Skinner after their delivery, was preserved as an unpublished manuscript, dated 1948, and is reproduced here.

Skinner worked on his analysis of verbal behavior for 23 years, from 1934, when Alfred North Whitehead announced his doubt that behaviorism could account for verbal behavior, to 1957, when the book *Verbal Behavior* was finally published, but there are two extant documents that reveal intermediate stages of his analysis. In the first decade of this period, Skinner taught several courses on language, literature, and behavior at Clark University, the University of Minnesota, and elsewhere. According to his autobiography, he used notes from these classes as the foundation for a class he taught on verbal behavior in the summer of 1947 at Columbia University. Thanks to Ralph Hefferline, who attended these lectures and distributed mimeographed copies of his meticulous notes, one can assess Skinner's analysis as presented in these early courses. But even as his pen left the page, Hefferline's notes were out of date: By the summer of 1947, Skinner's analysis had evolved considerably beyond that which he presented to the Columbia students, for that fall he gave the more sophisticated William James Lectures. As the text of these lectures differs greatly from Hefferline's notes, it is implausible that it was written in the few weeks between the Columbia class and the Harvard lectures. It is apparent that, at least in part, Skinner withheld his refined analysis from the Columbia students in order to unveil it in the much more prestigious context of the William James Lectures.

The manuscript of the William James Lectures is an important document not only to the historian of science but to the student of verbal behavior, for it provides an alternative exposition of much of the content of Skinner's book as well as some points that are covered nowhere else. But the manuscript was never published and therefore remained inaccessible to most scholars. Consequently, with the help of others, I created this electronic version of the document with the goals of making it more widely available and, just as importantly, permitting its contents to be searched and excerpted.

In service of this second goal, the present document is not a veridical copy, scan, or photograph of the manuscript. Rather, it is a transcription, a text, and the reader should be aware of what that implies. I have necessarily made some changes to the document, and it is the main purpose of this preface to explain what those changes are and what they imply for the scholar who wishes to cite the work.

I have preserved everything of importance in the original document and many incidental features that are of little importance. As an example of the latter, I have used the same font and have preserved the cramped spacing of the original. I retained the practice of underlining examples of verbal response rather than using italics. A printed copy looks as though it were typed and is essentially identical to the original. The pagination has been retained precisely, so one can cite the text without concern that there will be a discrepancy with the original manuscript. Words that are split across page breaks in the original are split here, and in the same place. However, the line numbers do not always coincide, as slight discrepancies in spacing, along with occasional editorial changes, add up over the lines of a page. I corrected all spelling, typographical, and transcription errors (of which there were hundreds), standardized the punctuation, and supplied the missing or faded characters at the remarkably tight margins of the original text. By inserting myself between the manuscript and the reader in this way, I might seem to be taking a liberty, but almost all such changes were trivial ones that any copy editor would have made without bothering to consult the author (e.g., the change of *anlysis* to *analysis*), and in no case did I introduce a change of substance, except as mentioned below. The text can now be read smoothly, and more importantly, any search for target strings will be highly accurate, if not perfectly so. Moreover, none of the errors in the original document have any historical value, for it is apparent from the nature of some of these errors - e.g., *rumor* for *humor*, *with* for *which*, or for *of* - that the manuscript was typed from Skinner's notes by a secretary, or perhaps a student, for the product is by no means of professional quality. The errors in the manuscript probably tell us more about this secretary than about Skinner.

In those cases where the correct form was uncertain, and where the error affected the sense of the passage, I explained my decision in the endnotes. My policy was to check *Verbal Behavior* for parallel constructions, and if I could find none, I made no change and offered a suggested reading in the endnotes.

I changed non-standard spellings to standard spellings (e.g., "neurone" to "neuron"), but since these were not errors in the manuscript but were presumably how Skinner spelled the words at that time, I recorded such changes in the endnotes. For the countless

abbreviations in the manuscript (*r*, *vb*, *acct*, *wd*, *spkr*, *mng*, etc.) I substituted full terms (*response*, *verbal behavior*, *account*, *word*, *speaker*, and *meaning*, respectively). No doubt those were Skinner's abbreviations, not those of his secretary, and I was tempted to retain them, for they do indeed tell us something about how Skinner wrote his drafts, and they impart to the manuscript a dynamic quality. But the abbreviations distract the reader and interfere with the smooth interpretation of the text. Moreover an important purpose of this project was to produce a searchable document. The scholar who wants to discover what Skinner said about *meaning*, or when he first started using the term *verbal behavior*, would find nothing at all in the present document under those terms if the abbreviations had been retained.

Skinner himself spotted some errors and listed them as errata on a page inserted at the beginning of the manuscript. I have made those changes in the text without identifying them. Most of them were minor, but one requires comment here. According to Skinner, almost all of manuscript pages 142 and 143 were out of place and belonged some 17 pages later, between the first and second paragraphs of Page 159. I have made that change as well, so that the text appears as Skinner intended it, but I did it in a way to preserve as far as possible the coordination of the present document with the original manuscript. Consequently, I left blank all of Page 142, and most of Page 143. The preceding and following pages therefore correspond exactly to the original manuscript. I then added two pages, 159A and 159B, to make space for the inserted passages, thereby preserving the correspondence of the two documents for all other pages. I have noted the insertion points and original page transitions in the endnotes so that the scholar who wishes to cite something from those very pages can make an informed decision about how to do so. It is my expectation that the present document, because of its availability and ease of use will become the standard source for scholarship, so to repeat and perhaps clarify the last point, if readers wish to cite any passage from pages 159-159B of the present document, and wish to attribute it to the 1948 unpublished manuscript by Skinner, they should consult the endnotes to determine on which page of the original manuscript the passage falls. If the present document finds a permanent home on the internet, as I trust it will, it can be referenced at that address as an edited version of the original document, and a reconstruction of the original pages will be unnecessary.

Perhaps in anticipation of publication, Skinner added two footnotes to Page 27, flagged with numerals, but as there was no room for them there, he inserted them in some white space at the end of the chapter on Page 36. As the reader would otherwise have no easy

way of finding them, I adjusted the line spacing of Page 27 and was able to fit them in at the bottom of the page. A third footnote appears in the original manuscript on Page 80, flagged with an asterisk. To differentiate passages keyed to my endnotes from those keyed to Skinner's own footnotes, all endnotes are flagged with a dagger([†]). The endnotes themselves are differentiated by the page numbers of the corresponding text, along with a few identifying words.

I want to acknowledge the generous assistance of Catherine Green, a graduate student in behavior analysis at Simmons College. Catherine transcribed over half of the manuscript and caught many errors in the text. Without her help, I would have many miserable hours of work ahead of me. I want to thank Ed Anderson of the Cambridge Center for Behavioral Studies for providing financial support for the editing of the project. Finally, I want to thank Jill Palmer, my wife and gimlet-eyed proofreader, for assistance in checking the final draft. In editing the text, we may have missed some errors or introduced others. The reader who spots one should notify me, and I will see that the master document is corrected.

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Leverett, Massachusetts
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CHAPTER I: Verbal Behavior - The Age of Words

We call this the Atomic Age, and for good reason; but it is possible that we shall be remembered for our concern with the expansive rather than the exceeding small - for having aspired toward the heights rather than the depths - and that we are living in the Age of Words. Nothing is more characteristic of our times than the examination of linguistic processes. It is true, we cannot claim to have discovered either the potency or the perfidy of words, but we are perhaps the first to accept the consequences. Not only have we recognized the importance of language in human affairs; in some measure we have acted accordingly. This is true of every important field of modern thought.

Whether it is to be atom or word, the physical sciences have played the leading role. If the scientific materialism of the nineteenth century failed, it was not because any particular philosophy of nature was proved wrong, but because a question arose whether man could fully understand nature in terms of any philosophy whatsoever. The exigencies of scientific practice forced this issue into the open as a question of the validity of statements. Certain key words - among them, of course, the classical examples of "space" and "time" - had to be examined. This was the first sustained attack upon the problem of reference in the modern spirit. It is curious that it should have been made in the field which must have seemed least involved in linguistic difficulties.

Logic has never been far from grammar, but the current relation is especially close. Some logicians define their field as the analysis of language, and frankly subdivide it into logical semantics, logical syntax, and so on. When the modern logician is not constructing or analysing formal languages, he may be found criticizing both physics and metaphysics, not as heretofore for their ideas, but for their grammar.

Psychology, in its original role as the science of mind, was under the necessity of establishing contact with its subject matter. Language appeared to be the natural medium, but there were difficulties. Indeed, the need for communicating with the world of mental process was generally felt to be a great nuisance. Under the modern hypothesis that thought itself is largely verbal, the medium has become a subject matter in its own right. Support for such, a program came from an unexpected quarter. In analysing the techniques of wit and other verbal processes, Freud reaffirmed a scientific determinism in a field of behavior which had appeared especially capricious and undoubtedly stimulated an analysis of the acts of speaking and hearing.

The social sciences, could hardly fail to share in this movement. Effective action demands some sort of communication between members of a group. Languages bound and perpetuate cultures, if not races. The technical successes of propaganda are enough to show the strength of linguistic forces in the social field. Often an interest in these matters is political rather than scientific, but it is still symptomatic of the age of words. The revival of national languages after the First World War and the attention given to an international language in planning for

the world of the future may reflect opposed political aspirations, but they exemplify the same faith in the power of words.

The science of linguistics has also become interested in verbal behavior during the same period. Classical linguistics was a branch of history which treated linguistic forms as cultural artifacts. It paid little or no attention to the human behavior which was responsible for these forms. The suggestion that linguists might study meaning or change of meaning as well as forms was once regarded as quite radical. But language in use eventually compelled attention - partly because of its growing importance elsewhere and partly because, in turning to the study of primitive and unwritten languages, the linguist was forced to examine the assumptions upon which classical grammar was based and to reconsider the thought processes which that grammar was supposed to represent.

As one might expect, the literary arts have been affected. If literature, like science, may claim a cumulative discovery of materials and techniques, the main contemporary contribution is certainly verbal experimentation rather than the exploitation of new subject matters. The dominating figure is, of course, James Joyce.

That an interest in linguistic processes should be characteristic of so many different contemporary fields can scarcely be laid to coincidence. Something is taking place in the history of human thought which is not the special concern of any one branch. A combined attack is forming upon a front which is as broad as human knowledge itself. But what can so many diverse fields have in common? Certainly not subject matter nor even practical methodology.

There is only one point at which all the sciences and the other areas of human thought meet - in the interpretation of knowledge. The crisis which has arisen in the slow and erratic progress which man has made toward a satisfying account of nature is this: The very process of knowing is now under examination. The philosophers have always been aware that there were problems in this field, but they were not practical problems. When it is once recognized that to know, is largely to be able to talk about, the immediate problem becomes linguistic, and this makes a great difference. If the verbal accomplishments which have been confidently looked upon as the culminating achievements of the human intellect are actually limited and distorted by the very nature of the verbal process, something must be done. We can no longer dismiss the matter as a topic for philosophical discourse. The problem must be squarely faced in the spirit of scientific inquiry.

In spite of the great enthusiasm and energy of this movement, it must be admitted that little progress has yet been made. The pitfalls of language were known to the ancients. Appropriate quotations from Plato are usually available, and by the time of Francis Bacon several classifications of the effect of words upon thought had been drawn up. Bacon's own treatment in the *Idols of the Market* has scarcely been surpassed. The verbal nature of abstractions, one of the chief modern "discoveries," was the rallying cry of Nominalism in the eleventh century, and the similarity is perhaps greater than we care to admit. Nominalism may have been concerned with theological abstractions

which do not interest us today, but this merely testifies to the heroic proportions of the argument.

The principal achievements to date have been negative. We have learned what sorts of words do not refer to real things and what sentences will not make sense and hence should not be composed. Certain linguistic traps have been avoided by consenting to talk about less of the world or with less certainty, but no clear conception of the nature of verbal knowledge has been reached. In psychology the hypothesis that thought is verbal might have been expected to loose a flood of research, but little has been done. In the social sciences we have been armed against propaganda, but effective tools for the control of linguistic phenomena remain to be developed. It is no doubt salutary and useful to reaffirm the place of language in human thought and action - whether scientific, philosophical, or literary. The admission that thought may be verbal ranks with the theory of evolution as a gesture of humility, if not humiliation. But a positive contribution is needed. Our submission to the tyranny of words will remain suspiciously masochistic until it is balanced by an aggressive impulse toward action.

The simple fact is that we have not yet developed a science of verbal behavior. We have no truly scientific concepts or techniques appropriate to the subject matter and no program which has inspired effective research. We can at the moment give no satisfactory account of what is happening when a man speaks or writes - or, at the other end of the verbal process, listens or reads. What such an account would be like is not even clearly understood. Instead, we have a number of special disciplines following special lines of interest, each with its own terms and techniques, none of which is effectively attacking the central problem.

What, for example, is the net contribution of modern logic toward such a science? Perhaps this is not a fair question, since most logicians will contend that they are not interested in a casual description but, rather, with how a man ought to proceed linguistically to obtain the most effective results. But many logicians engage in what is essentially an empirical analysis, and few are content to withhold all descriptive comment. Even in the construction of formal semantic or syntactical systems, the logician's experience with real languages plays a considerable part. But in what sense do logicians respect the canons of science in their treatment of verbal behavior? What are their methods of observation? What are their data? What is the status of the concepts and laws derived from these data? From the point of view of methodology, it is doubtful whether any logical account of language can be regarded as science at all.

A similar criticism may be made of linguistics. The linguist has not developed a central science of verbal behavior because his interests have lain elsewhere. Since a language need not be vocal the modern emphasis upon precise phonetic transcriptions is irrelevant. And a description of the languages of the world as part of cultural geography is not particularly helpful. A science of verbal behavior will be primarily concerned with processes which are independent of the physical, cultural, and historical accidents which particular languages have sustained. The factual material of linguistics, while important in its proper sphere, does not contribute directly to our knowledge of verbal processes. When the linguist deals with the latter, he has little if any methodological

advantage over the logician. What are his techniques of observation and analysis? Where in the universe of scientific method, for example, are we to locate the practices of grammar and syntax? Are they logical analysis or empirical description? The linguists themselves do not regard their technical vocabulary as appropriate to specifying the nature of linguistic acts. When they deal with the latter, they resort to other kinds of terms and other techniques. The commonest practice in a linguistics text is to describe a typical language situation and to point out certain essential features. This is often done at the level of casual discourse. But this is primarily what an adequate science of verbal behavior would make unnecessary.

Classical rhetoric might have been the forerunner of a science of verbal behavior. It began as an objective discipline which was perhaps closer to the pattern of a science than either the logic or grammar of the same period. It developed hundreds of technical terms to describe linguistic features. But rhetoric came to be used for purposes of ornamentation and persuasion, and this powerful application led to its demise as a pure science. The modern version, literary criticism, seldom makes any pretense toward scientific orderliness or rigor. Critics who are interested in literature, not as historical or cultural fact, but for the light which is thrown on the literary process, either construct terms appropriate to limited areas or adopt the non-technical vocabulary of the layman. The exception to this is the use of the conceptual system of psychoanalysis, but this is even farther from a central science of verbal behavior.

Other special treatments of verbal behavior - to be found in such fields as speech pathology, scientific method, philosophy, applied psychology, education, and so on - suffer the same limitations. Each deals with a small part of the field and there is no possibility of extending any one treatment generally. The logician's analysis proves to be of no value to the critic,[†] the grammarian offers little help to the advertiser, the work of the linguist does not prove useful to the scientific methodologist.

The only step toward a general account of verbal behavior has been taken by what is called Semantics. In 192__, in their epoch-making *Meaning of Meaning*,[†] C. K. Ogden and I. A. Richards proposed a science of symbolism. It was to be a general analysis of linguistic practices applicable to any field which involved language but under the special domination of none. Many attempts have been made to carry out this recommendation, but a general science has not yet been achieved. It is currently necessary to qualify the term semantics by specifying which branch is meant. The same special interests and special practices prevail. The original method of Ogden and Richards might be called philosophical, with some psychological leanings. Some of the more rigorous systems are frankly logical. In linguistics the field of semantics is concerned with the description and comparison of the ways in which meanings are expressed and how they change. Some semanticists deal mainly with the verbal machinery of society, particularly in the analysis of propaganda. Others, like the school which holds that all the troubles of the world are merely linguistic error, are essentially therapists. In current usage the term "semantics" stands for little more than a wish - the wish for a science of verbal behavior which will be divorced from special interest yet ultimately useful wherever language is used. But the science itself has not emerged.

The final responsibility for this fact must rest with psychology. What is wanted is an account of the events which occur when a man speaks or responds to speech. This is clearly a question about human behavior, and it can be answered only with the concepts and techniques of a science of behavior. But psychology has been unprepared for the demands made upon it, and each specialist has either had to devise what is essentially a linguistic psychology for his own purposes or go without. It is because psychology has failed in this respect that logicians like Bertrand Russell and C. W. Morris must undertake an empirical analysis of language, or that a linguist like Bloomfield must present the essential features of language by describing in which Jack asks Jill for an apple,[†] or that a critic like John Livingston Lowes must report the creative processes of Coleridge by resorting to an ingenious set of metaphors.

Why has psychology failed to provide the help which may reasonably be asked of it? It is not necessarily a matter of incompetence, because others who have tried excursions into the field have fared no better. It can scarcely be traced to an inaccessibility of subject matter, because it is of the very nature of verbal behavior that it have a clear-cut effect upon others. The difficulty is not a shortage of fact, for there have always been plenty of these, and two observers generally agree well enough as to what was said in any given case. Thanks to the development of the practical arts of writing and printing, we possess a system of notation which exceeds in convenience and precision any known technique for recording nonverbal acts. What is lacking in the study of linguistic behavior is a satisfactory general treatment. From the welter of factual material which overwhelms the field, we have failed to identify the significant events and to discover the significant relations among them. We are still in the process of collecting facts and ordering them with make-shift classificatory schemes. We have failed to explain these facts with a workable theory. We have failed, in other words, to develop a science of verbal behavior in the full sense of the word science.

When we examine the actual practices with which psychologists deal with language, we can see what is taking the place of such a science and an explanation of the present situation appears. Verbal behavior is the last stronghold of a doctrine of the causes of human action which has always stood in the way of the development of an effective science. Psychologists have not developed a workable conception of verbal behavior because they have, continued to accept a formulation which involved a fictional explanation of the data. No matter how adequate an account may be given in the non-verbal field, in the field of verbal behavior psychologists, like everyone else, have continued to explain the activities of the physical or biological organism by appealing to the behavior of an inner agent. This practice has elsewhere been profitably abandoned. It survives in the verbal field, partly because of powerful support from collateral treatments of the same subject, and partly because it has taken on a sort of disguise which can deceive the most critical objectivist.

The conception of verbal behavior which dominates the field today and which is accepted by most psychologists was most at home in frankly dualistic philosophies of human behavior. John, Locke put it this way:

It was necessary for man to use ... sounds as signs of internal conceptions; and to make them stand as marks for the ideas within his own mind, whereby they might be made known to others, and the thoughts of men's minds conveyed

from one to another.

The basic conception has survived practically unchanged for nearly three hundred years. Sapir, writing in 19__,[†] defined language as a "purely human and non-instinctive method of communicating ideas, emotions, and desires by means of a system of voluntarily produced symbols." A comparable position is taken by most linguists (Bloomfield being a notable exception) and by logicians, philosophers of science, and critics. Most of the words in English which refer to verbal behavior imply the same interpretation, so that it is impossible to talk about language, as in this very sentence, without invoking it.

The doctrine of the expression of ideas is not always associated with the purposes of an empirical science, but it has a similar immediate effect. The properties of an observed utterance are felt to be to some extent explained when they attribute to the properties the ideas which the utterance is said to express. The presence of particular words and their arrangement are accounted for in the implication that if the ideas had been different, the words would have been different or differently arranged. An unusual set of words is said to result from the novelty or originality of an idea. If we do not get much out of an utterance, it is because the speaker lacks ideas or cannot put them into words. And so on. We also use ideas to account for the temporal or intensive properties of an utterance, as when we say that So-and-so could not keep silent because of the force of his ideas, or that he spoke haltingly because his ideas came slowly.

The objection to this practice in a science of verbal behavior is that the ideas for which sounds are said to stand as signs are not directly or independently observed. The skeptic may wish to assure himself of this by attempting to survey without linguistic aid the ideas expressed in this lecture so far. The common practice is to restate the idea in other words, but a restatement is no closer to an idea than the original utterance. The possibility of restatement does show that an idea is not identified with a single verbal expression and may, in fact, be more clearly expressed as something common to two or more utterances. What is this something? Even if we express the idea in every conceivable way, we shall not get beyond the verbal level.

It is frequently the practice to bolster up the doctrine of ideas by appeal to images. The idea is said to be what passes through the mind - what one sees and hears and feels - when one is having it. Textbook examples are often convincing, but when one tries to apply the interpretation to actual verbal behavior only a small part of the ideas expressed in words prove to be representable in sensory terms.

That the ideas which verbal behavior is said to express are explanatory fictions is suggested by the ease with which we discover in the ideas precisely those properties needed to account for the behavior. It is obvious that we build up the ideas at will from the behavior to be explained. When we say that a remark is confusing because the ideas are unclear, we seem to be talking about two levels of observation. But there is only one level. Perhaps an appeal to ideas was justified when inquiries into verbal processes were philosophical rather than scientific, and when it might have been supposed that a science of ideas would some day emerge to put the matter in good order. But the practice stands in a very different light when seen from the point of view of a scientific account.

But the basic formulation due to the doctrine of ideas has

been preserved and something very much like it still dominates the field. It is the function of any explanatory fiction to allay curiosity and to bring inquiry to an end. The doctrine of ideas has had this effect in the field of verbal behavior by appearing to turn the important problem over to a psychology of ideas. The student of language leaves them there because they seem to pass beyond the range of his techniques, or because they become too obscure to make further study seem profitable, or because a final explanation seems too far off to sustain interest. By seeming to account for the characteristics of verbal behavior, the fictional explanation diverts the student from a direct attack upon the conditions which are really responsible. The effect can be traced historically to the fact that linguistics remained for a century preoccupied with forms alone. It is possible that a study of form was actually aided, because embarrassing questions of function could be avoided. In a similar way logic has perhaps been encouraged in its formal studies. But an early advantage, as in poor form in tennis or piano-playing, may be offset by later handicaps.

Perhaps no one today seriously believes in explanatory fictions of this sort. Certainly those who have made a specialty of exposing linguistic traps are not likely to fall into such an obvious one. Current expressions which seem to explain verbal behavior in terms of ideas may be little more than figures of speech. One consequence is the current practice of regarding a word (or any other unit of speech) as having an independent existence apart from the behavior of a speaker. Words are treated as tools or instruments. The physical existence of counters, tokens, signal flags, and so on, lends analogical support. The records left by verbal behavior - for example, the "words" on a page - also encourage it. These objective things are accepted as the proper data for study, while the verbal behavior itself is forced into the unnatural mold of the "use of words" or the "composition of sentences." We have no more reason to say that a man "uses the word water" in asking for a drink than to say that he "uses a reach" in taking the offered glass. In the arts, crafts, and sports, especially where instruction is mainly verbal, acts may be named, as when we say that a tennis player uses a drop-stroke or a skier a Geländesprung. No one is likely to misunderstand the nature of drop-strokes or Geländesprungs as things. But in the case of words, misunderstanding is common and disastrous.

Another consequence is the reification of meanings. "Meaning" is, of course, the modern version of "idea." Like an idea, a meaning is said to be expressed or communicated by an utterance. It may be clear or vague, and the utterance will be affected accordingly. A meaning explains the occurrence of a particular word in the sense that if there had been a different meaning to be expressed, a different word would probably have appeared.

The concept of meaning appears to have certain advantages over that of idea. Ideas (like the feelings and desires which are also said to be expressed) seem to be internal to the organism, but there is a promising possibility that meanings may be located outside the skin. Bloomfield identifies the meanings of a language with the whole of the universe and argues that a study of meaning would require the techniques of all the sciences. Meanings in this sense are certainly observable, and perhaps this is why the term has acquired a prestige which "idea" no longer commands.

When meanings have been moved to the outside world, they are

set down side by side with objectified words in corresponding arrays. Theories of meaning are genuinely concerned with how the linguistic entities on one side correspond with the things or events which are their meanings on the other side, and with the relation between them called reference. This basic conception of the study of verbal behavior - what we may call the correspondence school of meaning - is today in full possession of the field. It is so universally accepted in some form or other that it may seem impertinent to suggest that it is not necessarily appropriate to a science of verbal behavior. But it would be fortunate if it were not, because it is fraught with difficulties.

The first question to be asked is whether meanings have been successfully objectified. A fair case may be made for some kinds of words - for proper nouns, and some common nouns, verbs, adjectives and adverbs. These are the words in the case of which the doctrine of ideas could be supported by appeal to sensory processes. But what about words like atom or gene or minus 1 or the Holy Ghost? Corresponding non-verbal entities are not so easily discovered in such cases. Any correspondence must be mediated by other events. And when we come to words like nevertheless or although or ouch! it seems to be necessary to slip back inside the organism to invoke the speaker's intention or his psychological condition. As every semanticist knows to his sorrow, all "external" semantic frameworks are inadequate. A fairly large part of normal verbal behavior will not submit.

Even the words which seem to submit raise other sorts of problems. It may be true that proper nouns stand in a one-to-one correspondence with things, provided that everything has its own proper name. But what about common nouns? What exactly is the meaning of cat? Is it the physical totality of all cats? Or the class of all cats? Or must we abandon our program of externalization and fall back upon the "idea of cat"? The alternative seems to be to conclude that the word cat is an abstraction and that we observe only specific instances of its use. But this makes things difficult for the dictionary maker, and probably for the logician.

Even in the case of the proper noun, a difficulty remains. Assuming that there is only one man named Doe, is it strictly true that Doe himself is the meaning of the word Doe? If so, what happens to him when we convey or communicate him? It would seem to be necessary to say that the meaning is at best some relation between Doe and the word Doe. But where are relations?

The separate status of a meaning becomes even more questionable when we advance from single words to those collocations of words which "say something." "What is said" by a sentence is something more than "what the words in it refer to." Sentences do not merely refer to trees and skies and rain; they say something about them. But where is this something? Is it anything more than the idea which would have been said to be expressed by the same sentence under the older doctrine?

This problem is sometimes attacked with the concept of proposition, a somewhat more respectable precursor of speech. Russell, in his Inquiry into Meaning and Truth, defines a proposition as "something which may be said in any language." This seems to guarantee its preverbal or at least extra-verbal status. But where are propositions and of what stuff are they made? If propositions are to share with meanings the advantage of being outside the speaker, they must have physical properties. If they have not, how can they

have a place in a scientific account of verbal behavior? Since Russell is undertaking a semi-empirical analysis, the problem is a serious one. He tries to dispose of it with a favorite device - the theory of classes. A proposition is said to be "all the sentences which have the same meaning as some given sentence." This seems to bring the proposition down to earth as a class of verbal responses; but if the "something" which was capable of being said in any language has vanished, "meaning" has come in to take its place. It is difficult to see how to get rid of it if we are to be able to say that a given sentence is a member of a given class.

These puzzles are not, of course, original or new. Nor are they often so naïvely set forth. Many theorists of meaning feel that they can solve some, or even all, of them. But the commonest solutions usually raise other problems, most of them in the field of psychology, which certainly have not been solved. An appeal to the intention of the speaker, for example, will not be wholly successful until a satisfying account of that complex subject has been given. If connotative meaning is brought in to supplement a deficient denotation, it is necessary to supply an account of the associative process. When meanings are classed as emotive, another difficult psychological field is invaded. These attempts to preserve a correspondence theory by setting up additional categories for exceptional words are a sort of patchwork, which succeed mainly in showing how faulty such a theory is. But the collateral support which a correspondence theory receives from adjacent fields is prodigious.

The impulse to explicate a meaning is easily understood. It is laudable enough. Nothing is more natural than to ask "What do you mean?" The answer is frequently helpful. Clarifications of meaning have an important place in every sort of intellectual endeavor because they lead to more effective discourse. For such a purpose the method of paraphrase will suffice, and a framework of corresponding verbal and non-verbal arrays may be warranted, for, since both words and meanings seem to come in convenient packages, no question of the extra-verbal status of meaning need be raised. But although something is unquestionably accomplished by explication, it should not be allowed to generate a sense of scientific achievement. One has not accounted for a remark in a scientific sense by stating what it means. A study of meanings may have its proper place, but it is not in a science of verbal behavior. The prestige of a correspondence theory of meaning is not due entirely to the fact that clarifying meanings has practical value. Another source is due to the fact that corresponding arrays make interesting mathematical playthings. Logicians have eagerly accepted this productive device and have explored at length the possible correspondences which may be set up between words and things or between collocations of words and collocations of things. But it remains to show that these constructions have any close relation to real languages.

A correspondence theory also seems to get a sort of empirical support from the dictionary makers, who purport to set down the meanings of words. But dictionaries do not give meanings but only words having the same meanings. A dictionary of meanings is useful in the same way that an explication of meanings is useful. It does not answer the basic question of a science of verbal behavior. This may also be said for the work of the linguist in the field of descriptive semantics. It is possible to analyze the formal devices by means of which "meaning is expressed" in a given language, without compromising the nature of the process. The semantic correspondence is no more adequate for

a description of the underlying behavior than the logical or lexical account.

We have no reason to question the value of interpreting, explicating, or clarifying meanings. It is only when activities of this sort invade the field of an empirical science that trouble arises. What begins as elucidation or exegesis takes on the guise of a vague ascription of causes. The general practice among those interested in verbal behavior today is to give a semi-scientific explanation through the use of the concept of meaning.

Psychology has itself not been able to throw off this basic formulation. No matter how successfully it may have freed itself from a dualistic heritage in the field of human behavior in general, in the verbal field it is still struggling with an unsuitable and sterile conception. A scientific study of verbal behavior has no reason to regard itself as involved in a search for meanings, no matter how "meaning" may be defined. Its task is not to analyze[†] symbolic behavior or the function of symbols. It has no reason to give an account of the relation of reference or to discover the behavioral process which is assertion or which is communication. Meanings and symbols are not among its data, and they may never, God willing, turn up among its concepts. We have no reason to assume in advance that verbal behavior differs in any fundamental respect from non-verbal behavior, or that new principles must be invoked to account for it. To look for the meaning which a verbal response is supposed to carry or to accept a formulation of verbal behavior as the "choice of words" or the "composition of sentences" or the manipulation of any other sort of independent linguistic object is to approach the subject in its most difficult and unworkable form.

In these lectures we shall explore the possibilities of a fresh approach. In the beginning is the word - or, rather, verbal behavior. We shall accept this datum in the crude form in which it is observed. In the case of vocal behavior, for example, we are to deal with a complex set of muscular activities which result in the production of sounds. For most purposes we accept the sounds as sufficiently identifying the muscular activities. That this is the stuff of which languages are made has long been recognized. But it is of little value to assert, as Jespersen did, that "the only unimpeachable definition of a word is that it is a human habit," so long as it remains possible to add, "an habitual act on the part of one human individual which has, or may have, the effect of evoking some idea in the mind of another individual." Russell, in opening with a similar gambit, asserts that "just as jumping is one class of movements ... so the word 'dog' is [another] class," but he cancels the effect of this frank admission by adding that words differ from other classes of bodily movements because they have "meaning." We begin with the muscular behavior of the speaker, not because we wish to acknowledge that linguistic events depend upon an earthy substrate, but because it is the only observable datum with which a descriptive science of verbal behavior can begin.

Eventually we must do more than report that certain sounds have been uttered, but the next step must be taken with great caution. If we observe that someone utters the sounds 'cat' and report[†] that he "said cat," we report more than we have observed. We shall probably not be misunderstood for most purposes, but we have violated a fundamental rule of scientific procedure. Taking advantage of our membership in the same verbal community, we have iden-

tified the sounds as an instance of a common pattern and as probably having been uttered in connection with a certain kind of circumstance (as having had something to do with cats). But this we have not really seen. Our own responses to the sounds cat have been included in our report, but the difference between the datum and the interpretation has not been indicated. It is a wise precaution to test any method of observing or recording verbal behavior upon an unknown tongue. In such a case it would be impossible to convert a report like "he uttered the sounds cat" into the report "he said cat."

A more general case in which we characteristically overlook our own participation is that in which we report upon something which corresponds to the purposive meaning or significance of an utterance. The meaning in this case is not necessarily linguistic, and the practice is common in the non-verbal field. Whether meaning in this sense is an observable property of behavior is a question that has long been debated. Some psychologists argue that an act has not fully been described until its purpose has been specified. It is argued that running for a train is obviously different from running for exercise, even if we suppose that the physiological events are exactly alike, and that an aggressive act is obviously aggressive. But much more is included under the term "act" than is here meant by "behavior." In both the verbal and non-verbal fields we make extensive and often effective use of our own interpretations of the behavior of others, because a large part of scientific discourse is at the level of casual description. But in any rigorous analysis we cannot use any report of behavior, verbal or otherwise, which could not be made by a competent person regardless of the presence or absence of similar behavior in his own repertoire. A proper science of verbal behavior is not doomed to be as lacking in significance as this may suggest, for any important fact or relation will find its place.

But significance is not among the properties or aspects of the behavior itself. Just as we do not immediately observe that verbal behavior is symbolic or has content or expresses an idea, so we do not see its purposive significance.

We may compare the exigencies of a scientific analysis with those of philosophical discussion by considering a quotation from the Meaning of Meaning. "If we stand in the neighborhood of a crossroad," the authors write, "and observe a pedestrian confronted by a notice To Grantchester displayed on a post, we commonly distinguish three important factors in the situation. There is, we are sure, (1) a Sign which (2) refers to a Place and (3) is being interpreted by a person."† But do we observe any of these three things in the sense in which a fact is observed in science? Unless we have had some experience with English or a similar language we do not know that the marks To Grantchester are verbal at all and unless we have had some experience with signs on posts, we do not know, much less are we sure, that the presence or position of the sign has any relation to the geography of the country - that it "refers to a place." And because the man is confronted by the sign, we cannot be sure that any interpretation is taking place. Suppose that our pedestrian is gazing at a few stones lying on the ground. Are they signs and is the pedestrian interpreting them? Even if we could assure ourselves of the first two points, we cannot be sure that the pedestrian can read. We could begin to get some notion of the function of the sign if we compared the behaviors of the pedestrian in its presence and absence or by otherwise manipu-

lating the situation.

This is not merely a casual illustration. It adequately represents the central analysis, to me, which asserts that the following three factors are involved when any statement is made or interpreted: (1) mental processes, (2) the symbol, and (3) a referent - "something which is thought of."[†]

The great advantage of an ascetic definition of verbal behavior, if it proves to be productive in other respects, is that it specifies a datum which has an unambiguous status in the world of fact. We put aside once and for all the controversies concerning the nature of language or words. We not only know what the datum is, we know how to measure it. Any problem which arises here will at least be common to both verbal and non-verbal behavior. We do not refer to any sort of activity which is not carried out with the same kinds of muscles and with the same kind of energy as behavior in general. And the laws of verbal behavior, so defined, are potentially, at least, quantifiable. How carefully we observe and record in any given case will vary with our interests. Our records may sometimes need to be as exact as a phonographic reproduction; frequently we may find English spelling accurate enough as a system of notation. But in any event, there is no question of what kind of event took place.

Some of the problems which verbal and non-verbal behavior have in common will be recognized by those familiar with linguistic history. But in general we are in a better position to solve them under the terms of our definition. In order to handle large samples of verbal behavior expediently, for example, we need to break them into small functional units. The comparable analysis in linguistics has led to the word as a unit of speech. But whether the word is the right unit or not is still the subject of controversy. Perhaps the proper unit is larger (for example, the sentence), perhaps smaller (for example, the morpheme, or even the phoneme). The linguistic question is unnecessarily difficult because the term "word" serves in several ways. It may refer to history, as when we say that adamant is the same word as diamond, or to orthographic convention, as when we say that one word in German frequently becomes two words in English, or to function, as when we say that already is properly one word but all right two, or to a physical object, as when we count the words on a page, and so on. The parallel problem in a behavioral analysis is not simple, but its status is clear, and we may make use of our experience in the non-verbal field, where the problem can be treated more rigorously with the aid of crucial experimental tests.

Another problem with a familiar linguistic parallel is the difference between the single instance of a response and the response class. This becomes important in the later stages of description. Predictions are not made in terms of particular events. A particular event can only be described after the fact. What we predict is the occurrence of an event which will bear some resemblance to past instances and, with them, constitute a response-class. The comparable problem in linguistic theory is to distinguish between the "words" in a language or in someone's vocabulary and the "words" in a given remark. Clearly the word word does not refer to the same thing in both cases. The words in a language are classes of events, whereas the words in a given remark are particular instances.[†] The problem is difficult enough in any terms, but it appears in unambiguous form under a strict definition of verbal behavior as such.

The statement that verbal behavior is our fundamental datum must be qualified. The eventual question to be asked is this: "Why does a verbal response of such a form occur at a given time?" It may seem presumptuous to suppose that we shall ever be able to answer it in the case of most verbal behavior, but we must nevertheless set up our concepts and techniques with that question in mind. Hence we take, as our immediate datum, not the response itself, but its tendency to occur, or its probability of occurrence, or, in a word, its "strength." Questions may arise concerning forms of response (what we may call questions of topography) but our basic datum will remain that of response strength.

We account for this - for the probability that a given form of response will occur - by investigating everything that can be shown to affect it. The immediate situation in which the speaker finds himself, for example, makes some responses more likely to occur and others less. By analyzing the situation into stimuli we express the controlling relation more precisely. This analysis is something more than that implied by traditional stimulus-response formulae. We may observe, for example, that responses of the form piano occur more often than any other response in the presence of pianos or that pianos are the commonest objects to be found in all the situations in which the response piano occurs. This datum alone, apart from any experimental manipulation, would lead us to conclude that there is some connection between the object and the response in the verbal community under investigation. But we would not be justified in concluding that a piano elicits the response in the sense in which a tap on the patellar tendon elicits the knee jerk. The relation is much more subtle than that, but perhaps none the less lawful. What it is we can discover only by further investigation.

We must also go beyond the immediate situation to take into account the speaker's condition. This is either directly observed or inferred from his history or his collateral behavior. Terms like drive or need, emotion, interest, attitude, and so on, refer to factors of this sort. The consequences which have followed the emission of the same form of response upon past occasions are also important. They are dealt with in connection with learning verbal behavior, but our concept of probability of response enables us to undertake a broader treatment. The acquisition of verbal behavior is actually only a small part of the data, and may be given a correspondingly limited space.

The general scheme with which we propose to account for verbal behavior is similar to that of many sciences which are older and more advanced. We may express our program somewhat more rigorously in commonly accepted terms. The probability that a response will occur at any given time - the datum which we eventually predict or control - is technically called a dependent variable. The conditions and events to which we turn to achieve prediction and control are technically known as independent variables. Ideally we should be able to manipulate them, but the engineering problem which this involves may be distinguished from the methodological problem of the structure of the science. It is well to express our basic plan in terms of dependent and independent variables, not because we may enjoy some of the prestige of more highly developed sciences, but because we ought to know where we stand with respect to scientific method. We may not always be able to achieve the degree of rigor which such a formulation may imply, but a clear-cut statement of the task before us is advisable.

An adequate analysis will require more than the expression

of functional relations between the units of verbal behavior and the controlling variables. In normal behavior the independent variables occur in groups or in series, and the behavior shows corresponding complexities. The interaction of variables must be analyzed. Many of the data here will be familiar to students of double meaning, others appear in the field of projective techniques, still others in the analysis of style and wit, and so on in a long list. Verbal responses necessarily occur in order; and various types of order and disorder must be traced to the operation of complex variables. The fact that verbal behavior itself may become one of the conditions affecting other verbal behavior leads to still another set of data. The secondary languages of modern logic suggest one example; others involve the several ways in which one arranges, edits, or withholds verbal behavior at the point of emission. No one who follows the story to its conclusion will be likely to complain that the account is oversimplified. At least it is by no means simple. But, in spite of this, it remains possible, I think, to preserve our plan of accounting for verbal behavior in a functional analysis.

The independent variables permit us to answer the objection that a program in which verbal behavior is treated merely as behavior can not succeed. The conspicuous failure of stimulus-response formulae is perhaps responsible for this opinion. But these formulae were often little more than dogmatic assertions that the data in the field were all behavioral. They did not fail because they accepted verbal behavior as such. The stuff of which verbal behavior is made is not a question for theory or assumption but for observation. The larger significances which are so intriguing, and which have encouraged dissatisfaction with crude behavioral formulations, are to be looked for among our controlling variables. We are not preparing to simplify our study by leaving something out of account. Anything which can have an effect upon behavior must be examined. Of course it is true that what I am saying is more than the noises I am making - or so I should hope - but this "something more" is not a property of behavior. Roughly speaking, it is one of its causes. If those who hold a brief for the reality of communicative functions - meaning, ideas, beliefs, symbolic processes, and so on - would define their terms in accordance with good scientific practices, then the data which they use in their definitions would appear among our independent variables. Whether or not we are successful in dealing with them is a question of skill, not of the adequacy of the initial program.

Only when we have achieved a functional analysis can we fairly insist upon the behavioral nature of linguistic processes. Merely to point to the physiological substrate is not enough, since as we have seen all the old explanatory fictions may still be brought in. But in a functional analysis the fictions are dispossessed. The independent variables are the "causes" of verbal behavior in lieu of which meanings and ideas have served. This fact has been recognized by those who have wished to convert a theory of meaning into a causal science.[†] Certain liberal theories have attempted to embrace the empirical field by an enlargement of definition. If meaning is defined, for example, as "all the conditions which are responsible for an utterance," it will cover the present formulation. But it is questionable whether "meaning" then has any meaning at all. In any case it has the objectionable effect of suggesting that a unitary and coherent entity is at work. And there is always the danger that older definitions will come to life. It is safer to drop the term altogether.

To undertake to predict and control verbal behavior is a much more ambitious program than to characterize it by applying general principles. If the program can be carried out, it will apparently leave no question in the field unanswered. In accounting for the emission of verbal behavior, we shall at the same time have accounted for its more general characteristics. But we do not, of course, undertake to predict the verbal behavior of an individual in its entirety. We are never in possession of the relevant information, and could not handle it if we were. But this is the case in any science, no matter how exact. Physicists do not predict trajectories while playing tennis, nor does the chemist at dinner account for the surface tension of his soup. Science eventually compels us to believe that events are lawful, whether the lawfulness is proved in a particular case or not, by demonstrating lawful relations, usually under controlled conditions, in the case of a sufficient variety of events which we accept as typical. A similar program is not implausible in the verbal field.

There are instances in which we are able to predict the form of a verbal response or its probability of occurrence with satisfactory precision. This may be done by manipulating certain variables to force the behavior or by analysing variables which we can measure but not control. Some of our predictions may hold for single cases. In less favorable circumstances, they may be statistical. We may often make a reasonable use of relations which merely seem plausible from our everyday experience. This will be especially true in the early stages where the task is to discover the basic structure of the science.

Our goal at this stage is to develop a workable conceptual framework, to see what variables are likely to be the most fruitful in arriving at lawful relations, to develop a vocabulary for talking about the variables and relations, to evaluate the need for other kinds of factors or principles, to assure ourselves that the facts are indeed lawful and that this lawfulness will be demonstrated in a quantitative fashion when the field is more intensively studied. For these purposes our techniques seem to be adequate.

Those who are accustomed to thinking about linguistic affairs in traditional terms may resist this program. They may be willing to agree that the old formulation needed a fairly drastic revision. They may admit that while intelligent men seem to say perfectly sensible things about verbal behavior with the old vocabulary, it is not necessarily true that what is said has any important connection with a scientific account. They may even agree that the crude notion of the expression of ideas may dangerously perpetuate an unscientific and fictional system of explanation. But is not the revision here proposed a little extreme? Must the change be so radical? Isn't the use of a functional analysis an arbitrary application of scientific methods which may not be warranted or required? But our plan of campaign is by no means arbitrary. With respect to a particular statement of the aim of a science of verbal behavior, a functional analysis follows from the nature of the data. If anything is arbitrary, it is the statement of a goal. If we aim at the prediction and control of verbal behavior, this is the way to begin. The weight of the evidence from the history and philosophy of science is on our side.

It is only fair to acknowledge that the formulation has been used partly because of its success in the non-verbal field. We do not, of course, approach the study of verbal behavior entirely without

concepts and techniques. We may take advantage of whatever psychological science is available. But as everybody knows, there are several conceptual schemes in use in psychology today. Some seem more appropriate to the problems of verbal behavior than others. Several writers in the verbal field have preferred a Gestalt analysis. Bloomfield uses a modified behaviorism under the influence of George Herbert Mead and A. P. Weiss. Morris, in his recent *Signs, Language and Behavior*, refers extensively to the work of Tolman and Hull. I could scarcely conceal the fact, if I had any reason to do so, that the present analysis follows the formulation of non-verbal behavior presented in my book *The Behavior of Organisms*. But the basic scheme of a functional analysis is not personal property, and if any other theoretical position is taken in what follows, I maintain simply that theory should be kept to a minimum or at least it should follow the practices which have led to successful theories in other sciences. It is true that a number of studies of non-verbal behavior (studies absit omen, which have been made of the behavior of animals)[†] have suggested some of the lines of attack in the analysis which is to follow. But it is no part of the present program to show that any theory of behavior based upon these studies is confirmed by the verbal data.

A frequent comparison with the non-verbal field is desirable. One of the first questions to be answered is whether verbal and non-verbal behavior is continuous or whether some new process or principle emerges at the verbal level. Traditional treatments imply that there is a gap - that verbal behavior is somehow qualitatively different from non-verbal. Our preliminary definition has suggested that there is none. We can decide the matter by extending to the verbal field an analysis which has proved to be adequate for non-verbal data. If we can give a plausible account of typical verbal data without bringing in any new principle, the two fields may be accepted as continuous. If we fail, the question goes unanswered, for some other formulation might succeed.

But study of verbal behavior need not be undertaken in the spirit of an exposé. There is no reason to approach a special subject matter, as is so often the case, with axe in hand. Verbal behavior is not to be explained away, with a set of principles. The conditioned reflex is often used uncritically in just such an attempted disposition of a field. The Freudians have sometimes been guilty of a similar attitude in their analyses of literature. The assertion that D. H. Lawrence was merely trying to work out an Oedipus complex or that Alice in Wonderland is only a fantasy about birth and growing-up can be offered as an explanation of the literary facts only if the concept of fantasy or complex is based upon data which have a different status or a special validity. If history had taken a different turn, we might, with as much justification, have had a theory of literary criticism used to reveal the truth about clinical data. The only reasonable conclusion (to which, of course, many Freudians subscribe) is that the clinical and literary facts are similar and that they both support (or fail to support, as the case may be) the concepts used to describe them. In the same spirit we may accept the facts of verbal and non-verbal behavior as of equal importance and significance. One or the other may have some special advantage as a subject matter, but both will contribute to a scientific account of behavior on an equal footing,

This cooperative relation is possible because the sort of non-verbal science which we presuppose is confined to a single level

of observation. We shall not explain a verbal event by correlating it with another event taking place in some other universe of discourse. The only explanation to be attempted lies within the theoretical framework just described. In so far as a functional relation is the equivalent of what is commonly called a causal relation, we are able to dispense with other sorts of causes - whether these are ideas or neurons.[†] When the man in the street says that his nerves are on edge or that he has brain fag, he is obviously giving a fictional explanation of aspects of behavior, for he has made no observations of his nerves or brain. The practices of modern physiological psychology are, of course, usually above criticism on this score. But it is not a question of the existence of anything - whether idea or neuron.[†] It is a question of the use of the term as an entity in a scientific structure. Our intention of testing the continuity of the verbal and non-verbal fields is different from the program of the physiological psychologist, who is interested in showing, and may well show, that a certain type of verbal event is always accompanied by a certain type of neural event. This kind of two-level explanation is not intended here. In our comparison of the verbal and non-verbal field, we merely inquire into the similarity of data and the applicability of a common formulation.

A science enables us to talk about a subject more effectively. It does this, in part, by supplying appropriate terms. In the field of verbal behavior there are many types of relations and arrangements of variables which need to be designated. Should we use traditional terms, properly re-defined, or invent new terms? A new term may be unfamiliar, but it will be more precise and less likely to be misunderstood, and hence is to be preferred. But a series of lectures is not the place to develop a new vocabulary. The lecturer determines the pace and the listener cannot review the use of a term at will. I shall therefore keep unfamiliar technical terms to a bare minimum. A few concepts from the analysis of non-verbal behavior will be defined as they are introduced. Not more than half a dozen new terms will be devised, and only where nothing else will serve. Terms from everyday English which have some mnemonic value will often be adapted. A particular relation or arrangement which is not frequently referred to will go unnamed and be described by a phrase.

This technical vocabulary, moreover, will only be used where a rigorous formulation is required. For the most part, as in this lecture, I shall use ordinary English. This may appear to involve inconsistencies, as when the doctrine of ideas is attacked by using words which are historically associated with that doctrine. But the only alternative would be a very awkward and ineffective technical account. The fact is that the lectures have two functions, and there is a vocabulary for each. To present a formulation of verbal behavior I must define and use technical terms. But to present the reasons for such a program, to describe its general features, to exemplify a relation or to indicate consequences, I may, and indeed must, use familiar terms adapted to explication and clarification, even though the underlying metaphors would, if still alive, conflict with the technical account.

Another terminological difficulty - namely, that anyone dealing with this field is under the necessity of talking about words with words - is expressed by a motto which the late Professor Henderson suggested for an earlier draft of the present manuscript. Appropriately enough, it is from Emerson:

When me they fly, I am the wings.[†]

But just as we can think about thinking or be logical about logic, so we can in fact behave verbally with respect to verbal behavior. We shall never account for all verbal behavior because in the act of accounting for the last remaining instance we shall have created still another instance, but we do not deal with all behavior in this sense. It is only required that in our last account we create no new kind of verbal behavior. This recalls the serious side of the puzzle: What is the validity of a scientific account of verbal behavior if the interpretation which that account places upon our verbal practices is correct? An answer to that question must wait until we know what that interpretation is.

Perhaps the most damaging consequence of the unhappy and confusing history of a science of verbal behavior is simply the difficulty one encounters in showing that a scientific treatment is, indeed, possible and in indicating what it will be like. In spite of every effort at definition, the term is likely to spread to one or another traditional field. The collateral fields have had the advantage of an early start and they are full of interesting facts which make digressions hard to resist. Most of the material of linguistics, for example, is not relevant to our major problem, no matter how secure or fascinating the facts may be. Historical and comparative studies have yielded data which we must take into account, and we should not forget that certain types of generalization about linguistic processes can not be safely made with respect to a single language or family of languages. But the vocabularies and grammars of the languages of the world are generally beside the point. We shall also find many data and useful analyses in the field of logic, both classical and modern, but we are not primarily concerned with rules for clear thinking or the characteristics of ideal languages. Literary criticism is an especially tempting by-path. Literature often exemplifies verbal processes in conveniently exaggerated form, and an analysis of a literary work in terms of the biography, particularly the verbal history, of the writer is close to our own task. But literature as a part of history is quite irrelevant, as is also the evaluation of good and bad writing. In the field of speech pathology we find other data to be accounted for, but the execution of speech and the underlying physiological processes would be treated in detail only in a later stage of an analysis of this sort.

In comparison with the hard fact and practiced methods of these established fields, a general program of a science of verbal behavior may seem vague and unpromising. It will be possible to realize fully what such a science is like only when the program has been carried through and the framework filled in. Whether it is a workable program and, if so, what sort of science will emerge can only be determined in one way. Let us set to work and see what happens.

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CHAPTER TWO: Verbal Behavior as a Scientific Subject Matter

We are committed to an analysis of verbal behavior which does not appeal to ideas or meanings, which makes no use of a symbol or a process of symbolization, and which does not set verbal behavior apart from other behavior on the basis of observable properties. How, then, are we to define a special field? If there are no peculiarly verbal acts, why is a special treatment required? Should the term be dropped altogether? Surely this would be opposed to common sense. Verbal behavior is so obviously different from non-verbal behavior that two competent observers will agree almost perfectly in classifying instances. But on what basis? The traditional answer - that the verbal instances are distinguished by being symbolic or possessing meaning - is not available. What alternative have we to offer?

Just as we turn from the concept of idea or meaning to the variables of which verbal behavior is a function, so may we look there for a defining difference. Verbal behavior is not distinguished by any property of the behavior itself but by the way in which it achieves its effects. In the non-verbal field there is a mechanical, geometrical, and temporal connection between the properties of a response and the properties of its immediate consequences. Walking has the effect of a change in location which is closely associated with the mechanics of the response. Reaching toward is followed by contact with an object, pushing or pulling by due changes in the position of an object, and so on. The relation between an act and its consequences is treated in what is called reinforcement theory, but it does not matter here whether any particular theory is correct. The mechanical, geometrical, and temporal relations are obvious. They follow from the fact that behavior operates upon and changes the physical environment.

Verbal behavior is different. Only rarely do we shout down the walls of a Jericho or effectively command the sun to stop or the waves to be still. It is proverbial that names cannot break bones. Verbal behavior is impotent in the physical world alone. When we behave verbally someone must intervene if we are to achieve an effect. This simple fact, as obvious as any fact can well be, provides a useful preliminary definition: verbal behavior is behavior which is reinforced through the mediation of another organism. We shall see that the field thus defined is surprisingly close to the traditional field, especially when we recall that all definitions in terms of meanings and symbols have led to debatable borderlines. But this is not important. We want to define a subdivision of the field of human behavior in which special facts and problems may conveniently be treated together, and in this respect the definition is useful and reasonably rigorous. As it stands, a little too much ground is covered and further qualifications will be needed. For example, the behavior of a prize fighter depends upon the participation of another person, but a blow to the jaw is not usefully regarded as verbal. We say exclude some of these cases by referring to the way in which a reinforcement is mediated: we are interested only in behavior which is reinforced through the behavior of another organism.

The definition does not, and cannot, specify a form of behavior. Any musculature may be utilized in any way which is capable of affecting another organism. We are likely to think

mainly of the vocal form, not only because it is commonest, but because vocal behavior is nearly useless otherwise and hence seems to be necessarily end peculiarly verbal. But languages of gesture may be well developed, and a few cases in which the "speaker" speaks by touching and pressing the skin of the "listener" have been recorded. These are not mere transcriptions of prior verbal behavior. The skilled telegraphist responds verbally simply by moving a wrist, and he frequently does so without behaving verbally in any other way. Writing and typing may be either primordial verbal behavior or transcription. Pointing to printed words is also verbal - as, indeed, is all pointing, since it is effective only if it alters the behavior of someone. The definition will also cover manipulations of physical objects which are undertaken because of the resulting effects upon people, as in the use of ceremonial trappings. Here, and also in the case of any medium, the behavior is both verbal and non-verbal at once - non-verbal in its effect upon the object or medium, verbal in the ultimate effect upon the observer. Ceremonial languages, and the languages of flowers, gems, and so on, are of little or no interest. They have small vocabularies and little or no grammar. But their verbal nature is clear under the terms of our definition.

The intermediation of a reinforcing organism is responsible for the following special characteristics of verbal behavior:

(1) There is no relation between the energy level of the response and the magnitude of the effect. We sometimes shout to get action, but a whisper may have the same effect under other circumstances. This is not true of non-verbal behavior. In driving a nail, for example, the movement of the nail is a function of the force of the blow. As science develops systems of stored energy, this distinction loses import, and it is significant that the belief in verbal magic also declines. The steam shovel is the enemy of the word.

(2) Thousands of different responses having very different consequences are executed with the same musculature. No field of non-verbal behavior can show a comparable "vocabulary." This is partly due to the small scope and low energy requirements of verbal behavior. It is partly due to the fact that time can be used as a significant dimension in differentiating forms of response. There appears to be no case in non-verbal behavior in which a serial response has a single terminal effect because of its temporal patterning. Serial responses which must follow a certain pattern in order to be successfully completed (for example, in executing a particular kind of a dive) are not comparable. The potentialities of the temporal dimension are seen in the behavior of the telegraphist who might transmit all the works of Shakespeare merely by varying the temporal properties of a small movement of the wrist. This could conceivably occur without accompanying verbal behavior in any other form.

(3) Verbal behavior is normally very fast, greatly exceeding the speed of any non-verbal behavior with the same variety of forms and consequences. The limiting speed depends upon the mass which is set in motion in any particular form of behavior. Talking is faster than gesturing, and an external medium, as in writing or typing, exacts a penalty. In part, the speed is due to very rapid serial chaining, which is possible because the stimulus for each succeeding response appears promptly. We do not need to assume an especially speedy listener, because long responses may be reinforced only upon completion. The importance of temporal compact-

ness is seen in semantic aphasia and to a lesser extent in all behavior. To put it roughly, we must speak fast to speak big thoughts.

(4) The consequences of verbal behavior are not inevitable or even nearly so. Except in a few ambiguous situations, which are so unusual as to be entertaining, practical behavior has an immediate and certain effect. We touch what we reach for, ascend stairs with a speed which is always about the same for a given rate of stepping and so on. We do not always find what we are looking for, but at least we find the place in which we look. There are always immediate consequences of some sort. But in the verbal case a great deal depends upon the behavior of the reinforcing organism, which the speaker may have no way of predicting. The result is that verbal behavior receives a sort of periodic reinforcement which characteristically yields a moderate but fairly steady state of strength. We express this when we say that we behave verbally with a great deal less assurance than non-verbally.

(5) The effect of verbal behavior is delayed. The responding organism needs time. Even the quickest mediation will produce a delay in reinforcement which can be shown to have an observable effect upon behavior under laboratory conditions. Delays of this magnitude also contribute to the level of assurance, but there are more extreme cases. The reinforcement of written behavior is especially slow. The ultimate reinforcement may be delayed for days, or weeks, or years. The resultant low strength is familiar enough. We immediately tell all the news to a friend when we see him. The fact that we did not write to him earlier is only partly due to the greater ease of vocal behavior. The vocal form is stronger because it is more promptly reinforced. The abulia of the professional writer is legendary. The greater abulia of the unsuccessful writer who gets no reinforcement whatever is a corresponding extreme case of the previous principle.

(6) The gap between the speaker and the reinforcing listener means that the important properties of a verbal response must be presented at some point in an inorganic and intra-organismic form. The sound pattern has only a brief existence, unless recorded, but the marks on a page are perhaps quite permanent. These physical entities are not verbal behavior itself. They are traces from which the important aspects of the behavior may be inferred. We have already noted that they have encouraged an unfortunate formulation of verbal behavior as the "use of words." But they are not entirely a disadvantage. The effect of a verbal response can be multiplied by exposing many ears to the same sound waves or many eyes to the same page. Even without modern scientific aid, verbal behavior could reach over centuries and to thousands of listeners or readers at the same time. The result is opposed to the two weakening effects of the preceding characteristics. The writer may not be reinforced often, or even quite immediately, but in the long run his net reinforcement may be great. The final condition of strength can be determined only by taking all factors into account. The difference between the verbal and non-verbal case is clear, although science is here again slowly reducing it.

(7) In a given verbal community an individual becomes not only a speaker but a listener. The behavior of the listener contains nothing which is characteristically verbal, except when the listener is also in some sense speaking, but before completing our account

it will be necessary to analyze it in some detail. For the moment we may simply note that the physical step between speaker and listener means that the speaker can, and almost certainly will, hear himself. In the chaining of complex behavior one may also be said to react to one's own behavior, but the special nature of the verbal response leads to a very different result. There appears to be no non-verbal case in which one reviews his own acts as easily and as successfully as in going over a page of manuscript.

These seven characteristics follow from our preliminary definition. But they are not peculiarly verbal in the most useful sense. A practical effect is lacking in artistic behavior, which also has an effect upon other people, and hence shows some of the preceding characteristics in considerable measure. A narrower definition which establishes a more uniform field (and incidentally one which is closer to the traditional field) must be obtained by further specifying the behavior of the listener. The artist, no matter what his medium, casts about for devices which will have certain kinds of effects upon himself and others. A device may prove to be effective because human behavior is what it is or because the observer has had a particular history. But no special training must have taken place with respect to the kind of effect which the device is to have. If that is the case, the artist is behaving verbally.

What this special training is and how it affects the behavior of the speaker will become clearer as we proceed. It is the crux of the verbal problem. Verbal behavior arises in, and is shaped by, a verbal environment - an environment in which responses are characteristically reinforced in certain ways. A verbal environment is perhaps as close as we shall come to the traditional notion of "a language." How an environment arises is a problem in its own right. How it began is the old question of the origin of language. We are required only to show that a verbal environment could have arisen from non-verbal circumstances. We are in a better position to say how it grows and changes, for this can sometimes be observed. A verbal environment is the product of a long interchange between speakers and listeners, each changing the behavior of the other in some degree. The historical process need not be considered for our present purposes, since at any given time we can observe the conditions which obtain. We can discover how verbal responses are actually reinforced in a given verbal environment.

From these observations we can show why verbal behavior has certain additional and peculiar properties. As a verbal environment grows, it provides for the reinforcement of more and more advantageous forms of response. For this reason verbal behavior exceeds artistic behavior in several of the preceding characteristics, which will be discussed in detail later, but which may be listed here for the sake of completeness.

(8) Different verbal responses may lead to the same effect. A single reinforcer, or different reinforcers, may behave in the same way to different responses. As a result groups of responses acquire similar functional properties, as in synonymy or polylingualism.

(9) The same verbal response may be reinforced in different ways - by different listeners or by the same listener under different circumstances. A single response then acquires a complex functional

control, as in homonymy and irony. As a much more significant result of this characteristic verbal behavior may be freed from the special interests of the speaker, to acquire what we call objectivity.

(10) The two preceding consequences of the restricted definition are altogether responsible for the multiple causation, which is characteristic of verbal behavior, and which is responsible for some of its most interesting features.

(11) A verbal response may come under the control of a special aspect of the occasion upon which it is emitted. When that aspect is a single property or dimension of a stimulus, the behavior is said to be abstract - an exclusively verbal accomplishment.

(12) The special behavior of the listener which arises from his participation in a verbal environment leads to a special sort of self-knowledge. Its application to the problem of awareness is of special importance.

(13) Responses of novel form may be effective. The processes which produce the novelty in the behavior of the speaker are matched by other processes in the behavior of the hearer. A single neologism may have an appropriate effect. The many-worded novel forms of response which, as we say, express new ideas may also be effective. The idea itself, when redefined in terms of behavior, may be peculiar to the verbal field in this sense.

(14) A special kind of verbal response may arise in the behavior of the speaker which alters the behavior of the listener with respect to other responses. These responses are of extraordinary importance and are peculiar to the verbal field.

The list is too long, I am afraid, to be very effective when so laconically reviewed. But it should at least suggest that a definition based upon the mediation of reinforcement is capable of establishing a broad and important field. Whether or not we have matched a definition in terms of meaning or symbol, we have described a field which unquestionably warrants special study. And in spite of the fact that we face an almost infinite variety of facts, with ramifications into every field of modern thought, the definition itself is reassuringly simple and objective. It is quite possible that unifying and simplifying principles are not out of reach.

We must answer three questions of method before proceeding with our analysis. (1) How are we to report the occurrence of verbal behavior? (2) How are we to divide it into functional parts? (3) How are we to measure the probability of emission of each part? We may consider the vocal case as the commonest and most thoroughly studied.

The basic problem of how to make a record of verbal behavior was solved with the discovery of the separability of speech-sounds and the invention of phonetic writing. We may adopt a phonetic notation so long as we recognize that it does not report upon all properties of a response. Speech-sounds are "natural" in the sense that they are made by the speakers of a language rather than by the linguist, but even so they are selective. We have only to compare a phonetic report with an acoustic transcription or analysis to see how many properties are omitted in the former case. It is generally argued that the phonetic account contains the significant

facts about an utterance. But we cannot be sure that they are the significant facts from our point of view, and we must be prepared to supplement our report with additional material. The matter is a practical one. How much of verbal behavior do we wish to deal with? Suppose we observe that a child says No in a whining tone. If we undertake to say whether the response was No rather than Yes, a phonetic account will suffice. But we may also wish to account for the whine, and in that case we must certainly get it into our description.

Another sort of report of verbal behavior is the direct quotation. It analyzes the behavior into words and sentences. There is no simple correspondence with the phonetic account. Two phonetic patterns may prove to be the same word, and two words may have the same phonetic pattern. Although it is convenient to represent a sample of verbal behavior by direct quotation, a division into words and sentences cannot be taken seriously. These units may have a practical value, but they are not necessarily units of a functional analysis. We identify functional parts of verbal behavior through their relations with independent variables. Each relationship enables us to predict a particular part of the behavior. What parts have functional unity can be determined only by investigating the relations. We will find that a single phoneme or a single non-phonemic pattern is sometimes controlled by a single variable. On the other hand, a segment as large as what is usually called a sentence may behave as a unit in this respect. We can use neither "word" nor "sentence" to refer to a functional unit, although something which roughly corresponds to the sentence will eventually need to be considered.

Direct quotations and phonetic transcriptions are a curious anomaly in the field of scientific method. When we refer to the response It's four o'clock, the sounds we make or the marks we set down are not the response under consideration, for that response was presumably made by someone else at some other time. Nor are we simply imitating the response. Science does not generally use mimicry. We do not describe non-verbal behavior in a scientific sense by imitating it. It's four o'clock is the name of a response. The field of verbal behavior is distinguished by the fact that the names of the things with which it deals are acoustically similar to the things themselves. In no other science is this possible, because in no other case do names and the things named have the same structure.

Our basic datum, we may recall, is not a verbal response as such but the probability that a response will be emitted. This datum takes us beyond the classical notion of a vocabulary. One can be said to possess a number of different verbal responses in the sense that they are observed from time to time. But they are not entirely quiescent or inanimate when they are not appearing in one's own behavior, as the older notion of the "use of words" seemed to assume. We recognize the additional fact that some responses are more likely to occur than others and that, in fact, every response may be conceived of as having at any moment an assignable probability of emission. To ask where a latent response is, is like asking where the knee jerk is when the doctor is not tapping the patellar tendon. A latent response with a certain probability of emission is not directly observed. It is a scientific construct. But it can be given a respectable status, and it enormously increases our analytical power.

It is assumed that the strength of a response must reach a certain value before the response will be emitted. This value is called the threshold. We consider the effects of our independent variables in contributing toward that value even though the threshold is not reached. We also need to consider values above the threshold. This is especially important when we consider the pooling of separate contributions. It is only when we can conceive of a response as varying in strength along a continuum between zero and the threshold or beyond, that we can make any effective use of functional relations. A relationship which considered only two values of the dependent variable - the presence and the absence of a response - would not be very productive.

There are three types of evidence for the strength of a verbal response. In the first place, the very fact of emission means that a response is strong. This may seem obvious but the fact needs to be stated. Emission is a useful sign of strength when we observe a response[†] under unusual circumstances. In the case of a verbal slip, for example, we infer that the response which intrudes upon or distorts the standard response is especially strong just because it appears. The emission of a response under inappropriate or difficult circumstances is interpreted in the same way. The scientist who continues to talk shop during a thrilling football game or in a noisy subway gives evidence of the special strength of his technical repertoire.

A second sort of evidence, especially relevant to values above the threshold, is found in the properties of the emitted behavior. The evidence is often obscured by extraneous conditions, but we may consider it first in its purest forms. One such property is the energy with which the response is executed. This is not to be confused with strength in the sense of probability of emission, even though one is an indicator of the other. An energetic NO! is accepted as a strong response. Recalling our first indicator we may say that such a response would not be easily discouraged by competing forces. On the other hand, a timid no is accepted as a weak response, from which we infer a lack of power in the independent variables. A change from one level to another may take place rapidly under circumstances as in the case of Mr. Winkle in the Pickwick Papers, who just before falling into an alcoholic sleep, cried,

"Let's - have - 'nother - bottle," commencing in a very loud key, and ending in a very faint one.

Probably because of the nature of the speech apparatus, the pitch level of a response varies with the energy. Other things being equal, the louder the response the higher the pitch. Both energy and pitch level are especially clear indicators of strength in the speech of young children. The low and scarcely audible 'proper remark' upon a social occasion and typical playground shouting suggest the wide range of possible values. Other forms of verbal behavior may have a more limited range. When verbal behavior is written, some indication of strength may be found in the size of letters, pressure of the pen, underlining, and so on. Some allowance for these characteristics is made in the design of type. These are now mainly conventional devices but they retain some trace of an original variation with strength.

A secondary property is speed of emission - either the speed with which successive parts of a sample follow one another or the speed with which a response appears after a variable has been

changed. Strong verbal behavior is rapid. Hesitant speech suggests little strength, a ready answer strength; from a delay in answering we infer that something is possibly amiss in the controlling circumstances. In the strength of young children a delay of the order of one minute is common. In pathological behavior it may still be greater. Head reported an early case of this sort. He asked one of his aphasics to count. The patient did not reply until ten minutes later, when he burst out, "One, two, three, four ..."

A third indication of strength is the immediate repetition of a response. Instead of saying NO! with great energy, one may say No! No! No! A thousand times no is a sort of wholesale operation of the same sort. Both energy and repetition may be combined. Occasionally it is possible to observe the discharge of strength as successive responses drop off in energy, pitch, and speed; No! No! no! no!

Repetition as an indicator of strength is apparently responsible for a class of idioms concerned with special magnitudes, for example, Come, come, come and Now, now. Again and again, round and round, and miles and miles are complicated by an additional principle but probably show the effect of strength. A very, very sad mistake serves in place of a VERY sad, mistake, to confirm this interpretation.

The repetition need not be immediate, provided the responses occur so close together that the repetition can be attributed to a single momentary condition of strength. In the response No, it's not. Not at all. It's not a question of what I think, the exceptional strength of the form not is evident. In literature, with its characteristic exaggeration, this tendency may be converted into a stylistic trick: "...in the dusty forgotten corner of a forgotten room"¹ or "something seemed to swell and grow and swell within his breast."²

If two or more properties of behavior are taken as indicators of the same thing, they must vary together. Energy, speed, and repetitiveness seem to satisfy this test. At least we classify people according to the general strength of their verbal behavior in such a way as to suggest that our measures are closely associated. The garrulous person, when he is garrulous talks loudly, rapidly, and repeats himself. The taciturn man speaks slowly, quietly, and seldom repeats.

These indicators are appropriate to values of strength above the threshold. Even a weak response in this sense is emitted. But this part of the total range is useful in establishing a functional relationship. We may make a justifiable use of our indicators, however, only by allowing for other conditions. For example, the energy level and speed of response are used in most languages as modes of variation in developing different forms. In English this is not too great a difficulty, but even there we cannot use energy as an inevitable indicator of response strength so long as it serves to make de'•sert a different response from des•sert'. All three properties may also be differentiated because of special conditions of reinforcement. We speak more energetically to the deaf or to someone at a distance and we speak more slowly to anyone who has difficulty following us; and we may repeat in both cases. Special conditions of this sort must be allowed for in evaluating any given measure. The signifi-

¹ George Moore, Confessions of a Young Man. Cf. from the same:
"The world may be wicked, cruel, and stupid, but it is patient;
on this point I will not be gainsaid, it is patient; I know what
I am talking about; I maintain the world is patient."

² Arthur Machen, The Hill of Dreams.

cant fact is not that one speaks loudly but that one speaks above an energy level that would ordinarily prevail under the same conditions.

Another complication arises from the fact that the strength of the speaker's behavior is often not important to the listener and may interfere with effective discourse. Society, taking the side of the listener, restrains any extreme manifestation of strength and forces speech toward a standard level of speed and energy. If a child speaks softly, he is told to speak up. If he hesitates, he is told to hurry. If his words come tumbling out, he is told to be deliberate. So also with respect to the third indicator, to repeat oneself is bad form, and the double negative, which is merely the innocent result of a strong no, is called ungrammatical and illogical.

But if our indicators are somewhat obscured by these conflicting interests, it is still true that some evidence of strength survives. We still make practical inferences about a speaker's behavior from his energy, speed, and repetitiveness, as our examples have suggested. From the response a RED kite, we infer something different from the response a red KITE. In one case we conclude that the redness was of special importance; in the other the kite itself.

A complete leveling to a monotone is not achieved. For that matter it is not permitted, as we see in the case of the reader. A text is one kind of variable which controls verbal behavior. It does not ordinarily strengthen one response above another. The good reader must introduce spurious signs of strength. He reads as if his behavior were determined, not by a text, but by an assortment of variables similar to those in "real" speech. He does this by modulating pitch, energy and speed, in accordance with our analysis. Reading or reciting lines with good "interpretation" is precisely a matter of supplying indicators of strength so that the listener may infer a plausible set of determining conditions.

In addition to the strength of a verbal response under a given set of circumstances, we may be interested in what we may call its resting strength - its strength as a function of long range, enduring variables. A third type of evidence is useful here: the frequency with which a given response appears in the course of a long sample. Frequency counts give us the average relative probabilities of occurrence of different responses during the period covered by the sample. This is practically true by definition. We may use these counts whenever we are interested in such variables. For example, the number of times a writer uses I and me and my and mine in a sample of given size has been interpreted as a measure of egocentricity or egotism. Similar counts have been used to show that a writer's interests change from year to year - that he becomes more or less preoccupied with sex or death or any other subject. These interpretations involve certain assumptions about the conditions under which the behavior was emitted, but they support the general notion of a varying probability of response.

We have answered our three questions about method, then, in the following way: (1) We may report upon the occurrence of a verbal response with a phonetic transcription, perhaps no more exact than English spelling, provided we stand ready to supplement such a report with a description of non-phonetic properties when

they are important. (2) We are unable to use either word or sentence as a unit of verbal behavior because they are the products of a different kind of analysis. We have no reason to suppose either one will coincide with the functional unit which arises in our own analysis and find, in fact, that neither one does. (3) There are several ways in which we may estimate the strength of a response at a given time or during prolonged sampling. These answers are, in general, not based upon experimental evidence, but it is important to note that the basic formulation is appropriate to an experimental study.

Our first task in approaching verbal behavior as a subject matter is to classify the various kinds of relationships which exist between behavior as a dependent variable and the independent variables. In doing so we shall have to assume the operation of standard psychological processes in the fields of motivation, conditioning, and emotion. Only in terms of such processes can we account for the fact that a relationship arises in the behavior of a speaker and continues to be maintained. But a survey of these principles would be out of place here. They are not essentially verbal, and it will be more efficient to clarify each principle when it is first used.

Let us turn, then, to an actual case. We may begin with the type of verbal behavior which involves the fewest variables. In any verbal community we observe that certain responses are characteristically followed by certain consequences. Wait! is followed by someone's waiting, Shh! by silence, and so on. Much of the verbal behavior of young children is of this sort. Candy is characteristically followed by candy, and Out! by the opening of a door. The effect need not be invariable, but simply commoner than any other effect. The case is defined by the fact that the form of the response is related to a particular consequence.

There is a simple non-verbal parallel. Out! has the same ultimate effect as turning the knob and pushing against the door. The explanation of both behaviors is the same. They are examples of law-of-effect, or what I should like to call operant conditioning. Each response is acquired and continues to be maintained in strength because it is frequently followed by an appropriate consequence. The verbal response may have a slightly different "feel" but this is due to the special dynamic properties which arise from the mediation of the reinforcing organism. The basic relation is the same.

The particular consequence which is used to account for the appearance of behavior of this sort - to use a technical term, the reinforcement of the response - is not the controlling variable. Reinforcement is merely the operation which establishes control. In changing the strength of such a response we manipulate any condition which alters what we call the drive. This is true whether the door is opened with a "twist and push" or with an "Out!" We can make either response more likely to appear by increasing the drive to get outside - as by putting an attractive object beyond the door. We can reduce the strength of either by reducing the drive - as by introducing some object which strengthens staying in.

Our control over the verbal response Out!, as in the case of any response showing a similar relation to a subsequent reinforcement, is thus reduced to our control of the underlying drive.

Any problem which arises here is not peculiar to the verbal field and need not be solved for our present purposes. Unfortunately, the field of human motivation is not well developed. Classifications of drives and reductions to basic drives have met with only moderate success. We may avoid the systematic issues with the following procedure. For each state of affairs which can be shown to have a reinforcing effect upon verbal behavior we assume a corresponding drive. We leave any demonstration of covariation between particular drives and hence any proof of larger common drives till a later date. This practice is acceptable if we can find an appropriate controlling operation. We always come back to these operations in achieving the prediction and control of behavior, no matter what larger classification has been achieved. Fortunately, suitable operations usually can be found. For example, in addition to its effect in reinforcing a response, the reinforcement itself usually alters the drive or suggests ways of doing so.

It will be convenient to have a name for this type of verbal behavior. No traditional term can be safely used, for the basic relationship cuts across syntactic and grammatical analyses. I suggest the term *mand*, which has a certain mnemonic value derived from *command*, *countermand*, *demand*, and so on. A *mand*, then, is a type of verbal response which is characteristically reinforced with a special consequence and is therefore under the control of the corresponding drive. In particular, and in contrast with other types to be discussed later, there is no special relation to a prior stimulus. This is not to say that prior stimuli are not important. The presence of a listener is favorable for the reinforcement of all verbal behavior, and, as we shall see, comes to exert considerable control. But a listener is not associated with the special reinforcement of a single form of response and hence plays no part in the *mand* relation.

If we say that a particular *mand* "specifies" a particular reinforcement, then some *mands* specify simply the behavior of the listener. *Listen!* and *Look!* are common forms which *mand* attention. *Run!*, *Stop!*, and *Say 'Yes!'* specify other activities. But some forms specify the ultimate reinforcement, as when a hungry diner simply calls *Bread!* or *More soup!* Usually both the behavior of the listener and the ultimate reinforcement are specified. *Pass the salt!* specifies an action (*pass*) and an object (*the salt*).

We must eventually explain why the listener obliges. This is particularly necessary in the case of the *mand*, which operates primarily for the speaker's benefit. But a detailed explanation must be postponed until the behavior of the listener can be analyzed. It is another unfortunate consequence of the doctrine of ideas and meanings that many common processes are attributed to both speaker and listener. Both are said to have the same ideas and to use the same words. Most theories of meaning shift back and forth between speaker and listener with no regard whatsoever for the extraordinary differences in their behaviors. The basic processes in listening are quite unlike the verbal behavior we have so far discussed. It is true that the listener may simultaneously act as a subvocal speaker, but a similarity between a speaker and a listener is not surprising.

In general, in studying the behavior of the speaker, we assume the behavior of representative listeners as part of the

verbal community which serves as the background of our research. At the moment we must appeal to the motivation of the listener, in anticipation of a later discussion, in order to classify mands. If the listener is independently motivated in supplying a reinforcement, the mand is a request. The listener would have offered a match if he had known that the speaker would have accepted one. The response A match, please serves merely to indicate to the listener that the speaker will accept. A request presents to the listener an occasion for successful giving.

If the listener acts to escape a threat, the response is a command. Military commands are obeyed because of a standing threat. But Hands up! not only serves as a mand which specifies a form of action but as a threat from which the victim can escape only by obeying. The threat is carried by the extra-phonetic properties of the response. The motivation of escape-from-threat has been particularly, thoroughly investigated in the non-verbal field in the past few years.

If a different set of extra-phonetic qualities serves to generate a sufficient motivation on the part of the listener by means other than those which... [If] the listener will enjoy consequences in which the speaker does not otherwise participate, the response is either a piece of advice (Go west!) or a warning: (Look out!), according as the listener receives positive reinforcement or escapes from negative. If the listener is already motivated, but is restrained by a threat, the mand which cancels the threat is permission (Go ahead!). If a gratuitous reinforcement of the behavior of the listener is extended by the speaker, the mand is an offer (Take one free!). If the speaker characteristically goes on to emit other behavior which may be important to the listener, the mand is a call, either a call to attention or by name.

This rough classification of the motives of the listener will serve, pending further analysis. It is not necessary that listeners always respond, but simply that when they respond it is for the reasons indicated. The fact that it is so easy to find terms from the vernacular to describe these cases is interesting, for the classification offers strong, and rather unexpected, support for the general principle underlying our definition - that the behavior of the speaker acquires its distinguishing characteristics from the mode of mediation of the reinforcer. Requests, commands, warnings, and so on, seem to be ways of speaking. They are usually defined by appeal to the intention of the speaker. But the principal difference is in the behavior of the listener. The behavior of the speaker is also different, of course, because the special contingencies of reinforcement produce different dynamic controls, different interrelations among responses, and probably distinguishing intonations.

The motives of the listener are seldom substantial and it remains true that verbal behavior in the form of the mand operates primarily for the benefit of the speaker. Repeated mands are especially likely to generate revolt. Hence it is customary to soften or conceal the mand-character. The response Water! is not so likely to be successful as I'm thirsty, the form of which is characteristic of a different type of verbal response, or May I have some water? which appears to specify only a verbal, and hence a less burdensome, act. The fraud is exposed if the listener simply

answers Yes. Would, you mind getting me a drink? also pretends to specify merely a verbal response; in addition it recognizes the inclination of the listener. A more open deference to that inclination appears in the tag if you don't mind or if you please or simply please. The inclination to respond may be heightened by flattery or praise, as in Get me a drink, my good fellow. The Lord's Prayer, as a mixture of mands and praise, follows this pattern. The praise may be made conditional upon the execution of the reinforcement, as in Be a good fellow and get me a drink, which may be translated, If you get me a drink, I'll call you a good fellow. Gratitude may also be withheld until the listener responds, as in I'll thank you to get me a drink. Open bargaining is sometimes resorted to, as in Give me a drink, and I'll tell you all about it. The reinforcement of the mand is precarious, indeed.

A drive which leads to the emission of a mand upon a new occasion may not be exactly the same as the drive appropriate to past reinforcements. A few common elements may be responsible for an extension of the control. We acquire and maintain the mand Stop! because many listeners stop whatever they are doing when we emit it. But our behavior is not limited precisely to these listeners. We may also say Stop! to a car with faulty brakes or to a cue ball which threatens to drop into a pocket. What is the common element responsible for this case? What, in other words, is the essence of stopping? We can answer this question only by examining the kinds of circumstances under which the mand Stop! is strong. It is a problem for experimental analysis.

We may feel that talking to a car or cue ball is irrational since it can have no possible effect. But the underlying process is lawful enough. Strength of response is determined by past circumstances. Some similarity between past and present will account for the emission of the response without respect to its present effectiveness. Thus we also mand the behavior of dolls, small babies, and untrained animals. It may be done whimsically, the ineffectiveness being acknowledged, but the evidence of strength is there in the emission of the response. A further extension leads to the emission of mands in the absence of any audience whatsoever. The lone man dying of thirst gasps Water! and an unattended king calls A horse, a horse, my kingdom for a horse!

In spite of the irrationality of such behavior the source of strength is usually obvious. Responses of the same form have been reinforced in the past under similar drives.

But there are mands which cannot be explained in terms of a specific reinforcement or a somewhat similar reinforcement in the past. When the dice player exclaims Come seven! as he rolls the dice, he is not borrowing a response from a similar situation elsewhere. He does not ask for or get sevens anywhere. Here the strength of the response may be attributed to accidental correlations with sevens in the dice-playing situation. Many investigations of operant conditioning in non-verbal behavior have shown that an intermittent reinforcement (such as that provided by chance throws of seven) is sufficient to maintain a response in considerable strength. Even though we verbalize the lack of mechanical connection, we may retain the response in some degree of strength and continue to utter it, either whimsically or seriously under sufficient stress. In general, mands which specify the behavior of

inanimate objects are likely to get some reinforcement. A response like Blow, blow, thou winter wind, for example, is usually uttered when the wind is already blowing. The spurious reinforcement may produce quite a sense of power.

Other "irrational" mands may owe their strength to collateral effects which are not specified. For example, there are many common responses which mand the emotional behavior of the listener, and hence the mand is not reinforced according to specification. O dry your tears may result in the use of a handkerchief but it most certainly has no effect upon lacrimal secretion. Conversely, O weep for Adonais, in spite of its beauty, is less effective than a bit of dust in the eye. There are some things which the listener cannot do upon order, which are nevertheless specified in common mands. Here collateral effects may usually be observed. O weep for Adonais is part of a larger pattern which may produce tears in the sensitive reader for other reasons. The effect, which will be discussed later, is not characteristic of the mand, and is frequently obtained without the mand form. Extra-phonetic properties can usually be detected which produce some inclination toward weeping. Indeed, a good reader will supplement the response with very generous sound effects. Similarly, we do not say Cheer up in a dull tone. The effect upon the listener cannot be left to the mand relationship alone.

But we are dodging the main issue. Are there not responses in the form of mands which cannot be accounted for by any possible effect upon past or present occasions? Do we not create new forms of mands on the analogy of effective forms? Having successfully manded bread and butter, do we not then go on to mand the jam? Having addressed our friends and acquaintances successfully upon many occasions, do we not then in an oratorical moment tell Milton that he should be living in this hour? Of course we do. And perhaps not so irrationally either. Faced with a situation in which something must be done, we often bring non-verbal responses into play which have only a remote connection with the situation. And so with verbal behavior. The special relation which obtains between a response and its consequences seems to provide a general control over the environment. In moments of sufficient stress we simply name the solution.

This extended response we may call a magical mand. It does not exhaust the field of verbal magic, but it is the most powerful case. Flushed with our success under favorable circumstances, we set out to change the world without benefit of listener - single-handed, as it were - by our verbal acts. Unable to imagine how the universe could have been created out of nothing, we naturally conjecture that it was done with a mand. It was only necessary to say, with sufficient authority, Let there be light. We forget all about the need for a listener. No one in particular is addressed. Nor do we give any help to a possible listener by suggesting a line of behavior which might yield the ultimate reinforcement. We take the form Let from situations in which it is effective (Let me go. Let me have it.) and couple it with a statement of the appropriate reinforcement. Similarly, we couple the form O (which is partly a call and partly a sort of generalized mand-preliminary) to a simple statement of the reinforcing conditions (O to be in England now that April is here).

The magical mand is the natural form for wishing, blessing, damning and cursing. Most examples contain forms which seem to be especially appropriate to the mand relation. Two rather distant cases are Ought and Should. Characteristic examples begin with May: May you have a happy New Year, May God bless or damn you, and May you suffer the torments of Job. If we could trace the strength of the form May we might find a clue as to the process of magical extension.

As some of these examples suggest, literary behavior is a fruitful source of material of this kind. A survey of indices of first lines in a number of anthologies indicates that about 40% of lyric poems begin with mands. Fifteen percent specify the behavior of the reader. First of all, he is to pay attention, with both eyes and ears. This need on the part of the poet is perhaps similar to that which is responsible for the vulgar forms see and listen (as in There he stood, see, and I said to him. . .). But the reader is also to see where someone sits upon a grassy green, or to hark to the lark. He may also be asked to speak up (Tell me, where is Fancy bred?) or be quiet (Oh, never say that I was false of heart). But mainly he is asked to cooperate in various practical affairs related to the poet's drives: Come, let us kiss, Come live with me and be my love, Take, oh take, those lips away, Drink to me only with thine eyes. Only occasionally are these mands upon the reader magical, but Go and catch a falling star must be classed as such.

The reader is also asked to alter or control his emotions: Then hate me when thou wilt, if ever now; Weep with me; Love me no more; and so on. These specifications cannot be followed to the letter, but there may be collateral and perhaps not inappropriate results. The lyric poet enters the field of the magical mand when, in another 15% of the poems in the anthologies, he addresses someone or something besides the reader. Crimson roses are asked to speak, spotted snakes with double tongues are asked to vanish, and Ulysses, worthy Greek, is asked to appear. The remaining ten percent are plain statements of wishes, most of them prefixed with Let, May or the essential mand O.

The usefulness of literary material confirms a general principle which has already been mentioned and which we shall see confirmed again upon many occasions. "Poet's license" is not an empty term. Literature, as we shall see later on, is the product of a special verbal practice which brings out responses which would remain latent in the behavior of most people. The tradition and practice of lyric poetry encourages the emission of behavior especially under the control of drives or needs - in other words, in the form of mands. The lyric poet, if we may judge from this summary, needs several things. He needs a reader and the reader's attention and participation, and after that he needs to have someone or something brought to him or taken away as the case may be. The behavior which is strengthened by these drives is emitted, in spite of its manifest ineffectiveness or weakness, because of the poetic practice. The lyric poem is a sort of justification for irrational behavior.

What sort of advantage can be claimed for the mand as a descriptive unit in comparison with traditional treatments of the same material? First of all we may recall that it has an unambiguous status as a behavioral fact. It is a response of a specified

form. But it is more than this; it is a form related to a condition of the speaker associated with a particular reinforcement. In the optimal case, the condition is under the control of the investigator. The data to be considered are frequency of occurrence of the response and possibly its speed and energy characteristics. In the clearest case the mand relation is in exclusive control, but the principle is useful otherwise. We expect responses to appear when the corresponding drives are strong, even though they are combined with other kinds of responses. Thus a hungry man may be expected to show a higher frequency of forms which, if they were pure mands, would specify food, even though no response is predominantly a mand.

The traditional treatment is awkward and circuitous. The meaning of a mand presumably has something to do with the reinforcement which follows. The meaning of Candy! is what follows the response or perhaps the relation to what follows. On the other hand what is communicated would appear to be the drive - the speaker's state of need. In any case we have not accounted for the active side of the response - the speaker's intention. The mand not only accounts for a semantic relation, it shares the work of grammar and syntax. One thinks immediately of the imperative mood, but interrogatives are also mands (for verbal action), as are some subjunctives and optatives. Interjection and vocative are also relevant terms. Grammatical classifications suffer from a mixture of principles. They are strongly under the influence of formal descriptive systems which classify sentence types with as little reference as possible to the behavior of uttering sentences. To be effective in accounting for any single utterance, the grammatical, syntactical, and semantic analyses must be combined. The result seems top heavy in comparison with the relatively simple behavioral relation. We have not preempted all the work of a linguistic analysis with the relation just described, but what has been done has been done in a simpler way.

In the long run a choice must be made between descriptive systems on the basis of simplicity and effectiveness. The greater familiarity of the classical approach should not be put into the balance. Consider for example the following quotation from Jespersen's *Language*:

In many countries it has been observed that very early a child uses a long m (without a vowel) as a sign that it wants something, but we can hardly be right in supposing that the sound is originally meant by children in this sense. They do not use it consciously till they see that grown-up people on hearing the sound come up and find out what the child wants. (Jespersen, *O. Language*, p. 157.)

Nothing could be simpler or more easily understood. An intelligible point is made in connection with an episode which is intelligibly reported. The difference between such a vocabulary and the present is largely in what is left to be done. Has Jespersen described his case and stated his point in the most advantageous fashion for all concerned? Anyone who thinks of the psychological problems involved will certainly answer No. In contrast, how would the point be dealt with in the present terms? The expression "uses a long m as a sign that it wants something" would become "emits the sound m when a given drive is strong." The expression "the sound is not originally meant in this sense" becomes "if the relation to the drive is innate, the response is not verbal according to our defin-

ition." "They do not use it consciously" would become "It is not conditioned as a verbal response," and "until they see that grown-up people on hearing the sound come up and find out what the child wants" would become "until the emission of the sound is followed by reinforcements appropriate to particular drives." The whole passage might read this way: "It has been observed that very early a child emits the sound m when a drive is strong, but we can hardly be right in calling the response verbal. It is conditioned as a verbal response when people upon hearing the sound come up and supply various reinforcements appropriate to the child's drives." A parallel case of greater interest to parents of young children is crying. The cry of the young baby begins as an unconditioned response which is a function of various states of stress. It is the precursor of the conditioned and verbal cry which is characteristically followed by parental attention. The original cry is not verbal according to our definition. (As a matter of fact, the two cries probably have different phonetic and extra-phonetic structures.) The distinction between an unlearned and a learned response is the distinction which Jespersen is trying to make in terms of meaning and conscious use.

The simplicity of the translation is very different from the simplicity of Jespersen's account. The latter arises from familiarity and from its appropriateness in casual discourse. It is the difference between the systematic simplicity of science and the easy comprehensibility of the layman's account. Newton's Principia was not simple to the man in the street, but it was simpler than everything which the man in the street had to say about the same subject matter.

As we turn to other types of verbal behavior and move on to consider how our variables combine and interact, traditional terms will grow less and less useful, and as the lay vocabulary grows it will appear less and less simple. I can only hope, on the other hand, that the analysis that we are engaged upon here will develop power and significance and that in the end you will agree that it has been worthwhile.

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CHAPTER THREE: Types of Verbal Behavior

In the last lecture several points of method were illustrated with a type of verbal behavior called the mand, in which the form of response was related to a common, though not inevitable, consequence. A special feature of the mand is that its form is not controlled by any stimulus acting prior to the emission. The response is functionally related to a drive, and we control it through any operation which will change the drive. We cannot call the drive a stimulus or make it part of a "total stimulating situation" because it does not have the proper dimensions.

But prior stimuli are important. A child may emit the mand Candy! in vacuo, so to speak, if the drive is very strong, but the response will appear at a lower drive level in the presence of someone who frequently provides candy, and at a still lower level in the presence of actual candy. The reason for this is clear enough. The comparable process in non-verbal behavior has been fairly thoroughly investigated. The person who frequently provides candy has the status of what is called a discriminative stimulus. In the presence of such a stimulus, a response is likely to be reinforced; in its absence it is likely to go unreinforced. The result is that the response is stronger in the presence of the stimulus. The additional presence of candy creates a situation in which a reinforcement is still more likely to be received and which therefore acquires a still more powerful control.

All stimuli which control particular verbal responses are of this sort. They are not eliciting stimuli, either conditioned or unconditioned. The close temporal and intensive relation between stimulus and response which obtains in elicited behavior is lacking. A stimulus simply makes a verbal response more likely to occur. In some cases it may be the principal determiner and a response may appear quickly and practically invariably when the stimulus is introduced. The stimulus may seem to elicit, but it remains discriminative, even so. It is not a simple stimulus-response formula because three terms are always involved: a stimulus, a response, and a reinforcement which is contingent upon both. The stimulus has whatever power it possesses because it is the occasion for successful responding. Its control may be no less lawful than that of an eliciting stimulus, but it is different, not only in its temporal and intensive relations but in its dependence upon certain sustaining conditions.

In the example of the child who is more likely to say Candy! or to say it more energetically in the presence of candy, the response remains a mand. It won't occur if the candy drive has been satiated, if this is the only condition under which the response has been reinforced. The primary control is feeding or fasting or altering the drive in any way. The relation to candy as a stimulus is similar to the relation to the person who frequently provides it as a reinforcement. It is true that such a person is usually involved in other reinforcements, while the prior stimulus of candy is an occasion for the successful emission of the form Candy! alone. But, as we should say in the vernacular, it is still true that the child is not quite naming, or describing, the candy. Other descriptive terms appropriate to the candy are

not emitted (say, sweet or pink or pretty) and the form Candy! itself would not be evoked if the drive were weak.

The most superficial survey of verbal behavior, however, shows that many responses are controlled by stimuli regardless of any special state of drive. These prior stimuli may be objects or events, or records of the verbal behavior of others. We comment upon the season without attempting to change it, we read the headlines of a newspaper without interest, we idly recall a bit of verse or a snatch of song, or mechanically repeat a question which someone has put to us. None of this behavior is directed toward the satisfaction of a particular drive. Indeed, it is most advantageous for all concerned when it is not. The greater part of verbal behavior is not under the control of special interests. On the contrary, it is under the external objective control of the environment. The case is exactly the reverse of the mand. How are we to account for it?

A specific relation to a drive can be broken down by reinforcing a single response with states of affairs appropriate to different drives. If we reinforce a selected response with food, we may subsequently control it by changing the hunger. If we also reinforce it with water when the organism is thirsty, we may control it by controlling the thirst. The response will now appear when the organism is either hungry or thirsty or both. This process can go on until we exhaust all the identifiable drives. In the end, the response will be strong except when the organism is completely satiated in every way or asleep.

This process of multiple reinforcement would be of little help in breaking down the relation between verbal behavior and specific drives. We should have to reinforce thousands of responses in hundreds of different ways. But we can greatly simplify the process and achieve the same effect by using what is called secondary reinforcement. This is a state of affairs which characteristically precedes a primary reinforcement. A single state of affairs which characteristically precedes many primary reinforcements might be called a generalized secondary reinforcer. We have only to reinforce a verbal response with a single generalized secondary reinforcer to obtain the desired result. Multiple reinforcement is required only once in establishing the effectiveness of the secondary reinforcer.

The great generalized reinforcer is, of course, money. Money can be exchanged for primary reinforcers of great variety and any response which is reinforced with money tends to be strong most of the time. Another generalized secondary reinforcement we call approval. We cannot identify its physical status as easily as in the case of money. It may be little more than a nod or a smile or That's right! or Good! We also cannot easily show why it is reinforcing. But anyone who approves an act will probably in the long run provide other reinforcements in considerable variety and number. By gaining approval we increase the likelihood of receiving primary reinforcements. This is especially true in the case of approval by parents and others in the position of providers, and we find that the approval of such people is especially important.

Another generalized reinforcement may be called escape from

threat. It has been studied in detail in the non-verbal field. Unfortunately, it is the commonest reinforcement in education. The student, to put it crudely, is to behave in a given fashion or else. The or else refers to poor grades, failure, dismissal, and so on. Of course, we might say that the student works for high marks and a diploma, but these are relatively weak generalized secondary reinforcers and the actual practices in educational institutions suggest that escape from threat is usually more important. Sometimes such a condition leads to behavior which specifies a reduction of the threat, when the response is a mand according to our definition: Don't hit me, Don't give me a D. But when the release from threat is used to strengthen behavior which does not specify release, the reinforcement is generalized, as in the case of money and approval.

Reinforcements of this sort continue outside the educational situation. We commonly talk to avoid the threat of censure which arises during silence. The generality is clear in the report, "I tried desperately to think of something to say." This might be translated, "I was moved to say something but no responses were strengthened by the situation." A similar demand for speech at any price may be observed when the drive is for money (compare the professional lecturer or entertainer) or for approval (compare the overzealous student in the classroom). But as a rule, a generalized secondary reinforcer is used to establish and maintain behavior which is controlled by the specific variables to be noted in a moment.

By far the greater part of verbal behavior in children is built up, independently of specific drives, through the use of generalized secondary reinforcements - particularly approval. Unless a child is seriously neglected, a surprisingly large amount of time is spent in reinforcing it as it correctly names objects, colors, and so on, correctly repeats speech patterns, and at a later stage, correctly reads a text. When a child emerges from this educational stage, it continues to receive generalized reinforcement from the success which follows the exercise of verbal behavior in the social environment. Behavior - which is unrelated to the specific drives of the speaker is likely to be for the listener's benefit, and most cultures guarantee the continued activity of the speaker by arranging for generous reinforcements.

Generalized reinforcements are usually made contingent upon the emission of a given form of response in the presence of a given stimulus. Parents do not ultimately approve a wrong name or a badly echoed response. Society is not likely to be generous toward the speaker who gives an inaccurate account of an event or a text. The chief purpose of a generalized reinforcement is to minimize the special interests of the speaker and to assign a more powerful control to the environment. This control must now be analyzed.

There are several kinds of relations between verbal responses and prior stimulating events. Each has its own problems and must be considered separately. The non-verbal stimulus is, of course, the most important. Indeed, the relation between verbal behavior and this kind of variable is often dealt with exclusively in theories of meaning. But a verbal response may also be controlled by a text or by the heard response of another

speaker. We must take all relations into account. If we did not, we would arrive only half prepared at the later stages of our investigation.

We must ask several questions about each type of relation. What is the evidence that it actually exists? What conditions of reinforcement can we discover to explain its origin and its continued maintenance in strength? What is the ultimate unit of correspondence between response and stimulus?

To begin with a relatively simple case, the form of a verbal response may be controlled by the heard speech of another person. In the special case to be considered first, the response produces a sound pattern which is similar to the pattern heard. The similarity may be great, as in the case of the skilled mimic, or merely fragmentary, as when a single speech sound or intonation is picked up. In the latter case it may be difficult to prove the functional relation, but it can sometimes be done, and we should define the type to include units of every size.

Verbal behavior in which the form is controlled by previously heard speech may be called Echoic Behavior. It is demonstrated in the simple fact that older children and adults can, as we say, repeat a verbal response when asked to. This seems obvious and trivial, but a long course of learning lies behind the "ability" and a tendency to repeat plays a much broader role in verbal behavior as a whole. The statement that someone can repeat a remark needs to be qualified. In any determined system there is no difference between "can" and "will" except that "can" implies a set of circumstances which must be specified in the case of "will." The fact that a person "can say Beaver" is simply the fact that there are circumstances under which he will. If we say to him Say 'Beaver', the remark is a mand for verbal action. The listener, who is shortly to become our speaker, will be motivated according to whether we have made a request or given a command, and so on, but the form of his response will be determined by our own sound pattern Beaver. Mands of the form Say X characteristically produce Echoic responses in the listener.

But echoic behavior exists in strength when the special motivation of Say X is lacking. In the standard word association experiment, the repetition of the stimulus word must be prevented by explicit instructions or at least by implication. Even so, a fragmentary echoic behavior appears in the clang associations; the response words are alliterative or rhyming or, in the long run, statistically similar in stress pattern. Pathological examples are seen in the various forms of echolalia. A tendency to echo is also shown when particular verbal forms are picked up and passed around in a conversation. The two halves of a conversation have more words in common than two monologues on the same subject. If one speaker says incredible instead of unbelievable, the other speaker will, in general, and because of the present relation, say incredible. A fragmentary echoic behavior is evident when one speaker adopts the accent or mannerisms of another in the course of a sustained conversation.

The reinforcements which account for the strength of echoic behavior are quite obvious in the case of young children. It is not so obvious, but perhaps nonetheless true, that a considerable

measure of reinforcement is contingent upon echoic behavior outside the educational field. There is a net advantage in using verbal forms which appear in the behavior of the person we address. Presumably they are forms which will be effective in altering his behavior. When the difference is great, our conformity to the vocabulary of the listener may be more than echoism. We may suppress ineffective responses and encourage or discover effective ones by a process of self-editing. Something of the sort is obvious when an English-speaking person first undertakes to speak nothing but Basic English. But there is also a drift toward the vocabulary of the listener which seems to be due to the echoic relation, and the advantage which follows may explain in part why echoic behavior continues. Echoic responses are also useful, and hence probably reinforced, when they serve as fill-ins. We may answer the question What is your opinion of the international situation? by beginning My opinion of the international situation Except for the form My, this may be pure echoism.

There is also the possibility that echoic behavior is self-reinforcing. If we assume that the speaker has been first a listener, and that certain sound patterns have been associated with events which make them secondarily reinforcing, reinforcement may be automatic. The principle of self-reinforcement, however, is broader than the echoic case. The exploratory verbal behavior of the young child alone in the nursery is not echoism (except for a few responses in which the child might be said to echo himself), but is automatically reinforced because some of the sounds made by the child resemble sounds he has heard in the verbal behavior of others. In the same way, an adult may acquire forms of response and intonational patterns which are automatically reinforcing because they are associated with another speaker - often a person of prestige. The automatic reinforcement of an echoic response is limited to the effect which a resulting pattern has because it matches a pattern just heard.

This is not an appeal to any instinct or faculty of imitation. It is not assumed that the formal similarity of stimulus and response supplies any advantage in executing the response. The fact is, there is no similarity between a pattern of sounds and the muscular pattern which produces similar sounds. At best we can say only that the self-stimulation which results from the response resembles the stimulus. This may play a role in reinforcement but not in evoking the response. The parrot presumably imitates for the same reason - not because a sound pattern sets up a train of events which lead to the muscular activities which produce the same sort of sound, but because the parrot is reinforced whenever he makes sounds which resemble those he has heard. What is instinctive in the parrot, if anything, is the capacity for being amused by such similarities. Echoic behavior, like all verbal behavior, is conditioned. Any formal similarity of stimulus and response must be developed by a special contingency of reinforcement.

That a sound pattern has no innate tendency to generate a response which will match it is all too evident when we examine the long process by which echoic behavior is acquired. The attempted echoes of young children may be very wide of the mark, and the parent must reinforce very imperfect matches to keep the behavior in strength. We might say that the child has no way of

knowing how to execute a particular response for the first time; strictly speaking, we should say that the response is not yet a function of any important variable. Certainly nothing in the pattern to be echoed will help, until some overlapping echoic behavior has been set up. Trying to make the right sound, like trying to find one's hat, consists of emitting as many different responses as possible until the right one appears. Some responses may be more relevant than others. They have had similar reinforcements and hence vary to some extent with the current drive. We may also vary old patterns to increase our chances with fresh material, just as we keep ourselves from looking for the hat where we have already looked. But otherwise it is a case of responding and checking the result. Fortunately, we may approach the right sound pattern step by step, because we shall probably hit upon partially corresponding patterns which we can then repeat with variations. It is a well-known fact that a young child emits speech sounds which he later finds it very hard to execute in learning a second language. This is not because enunciation has become more difficult or because the speech apparatus has somehow been warped. It is the same difficulty of "finding" the right sound. The development of a large echoic repertoire appropriate to a given language makes it harder to find and to repeat a response which does not belong in the language. When the occasion for a new echoic response arises (as when someone says Say 'th' to a French-speaking or German-speaking person), it is probable that a standard but inaccurate form will appear - perhaps z or d according to the echoic patterns of the mother tongue.

Echoic behavior is an especially favorable ground upon which to discuss the problem of unit of response. Even though the stimulus and the response are not similar - one being composed of sounds and the other of muscular responses - the sounds which are produced by the response do resemble the stimulus and for brevity's sake we may speak of a formal correspondence in this sense. When a sizeable speech pattern is echoed, then, there is a detailed formal correspondence between stimulus and response. The initial consonant of one resembles the initial consonant of the other, and so on. But this does not mean that there is a functional connection between each feature. The functional units may be much larger than single sounds. A chemist will repeat diaminodiphenylmethane correctly and with ease, but not because he has any special ability to string together a long series of separate sounds. His everyday experience has built up fairly, large appropriate echoic units. These may be as large as diamino and diphenylmethane, or merely di and amino and phen, and so on. Perhaps the affixes -yl and -ane have some functional unity in this sense. An equally intelligent man with no experience in chemistry will have none of these units available and will probably do badly on his first attempt. It is quite probable in fact that, as in the case of the speaker of French who tries to hit the sound th, he will emit approximately similar units from his own verbal repertoire. Diamino may first appear as dynamo, and so on.

The first echoic responses acquired by a child, are usually fairly large patterns. A basic phonetic repertoire develops later and often quite slowly. There are two possible channels of growth. The generalized educational reinforcement may be made contingent upon small unitary correspondences. We may set up an

echoic repertoire by teaching the child to say ah, sp, and so on. The acquisition of this basic repertoire need not preempt or interfere with larger units of correspondences. The child may still continue to echo with responses as large as syllables or words or even sentences, but when necessary it can now fall back upon the single-sound repertoire.

But the functional unity of small correspondences also seems to arise as a matter of course when many larger correspondences are set up. This fact will be found to be highly significant when we consider the parallel case in which unit verbal forms come to correspond to features of the non-verbal world of facts and things. If we needed to consider only a single echoic response, the problem would not arise. It would not matter whether the solitary response Beaver, standing alone as the only word in a child's vocabulary, were composed of a single functional correspondence or a series of phonetic correspondences. But when the child acquires a dozen echoic responses, all of which begin with the sound B, we can begin to speak of the functional independence of this unit. Our justification for doing so is that the child will now correctly echo a thirteenth pattern which begins with B to the extent of beginning with a B also.

What are the minimal units of an echoic repertoire? If the repertoire is established bit by bit, the process itself will answer the question. If it arises from the growth of a large non-atomic repertoire, we cannot be so sure. Intelligent people stumble in echoing foreign names which contain no new phonemes, and there are very great individual differences in the tendency to do so. We must conclude that in some cases a functional phonetic repertoire is fully developed, in others not. The phoneme is not necessarily the smallest or ultimate unit. Intonations, accents, and mannerisms are picked up in this way. The skilled mimic has what we might call a small-grained repertoire which permits him to echo novel sound patterns accurately. It also permits him to echo sounds which are not verbal, but we may confine the term here to the duplication of speech sounds in the broadest possible sense.

An echoic repertoire is established in the behavior of children because of the help it provides in developing other kinds of verbal behavior. The basic relation in operant conditioning, which underlies all verbal behavior, is the contingency between response and reinforcement. But this contingency will not by itself account for the acquisition of verbal behavior. In our discussion of the mand, for example, little was said about acquisition. Reinforcement was considered mainly for its effect in sustaining behavior. A sizeable vocabulary cannot be set up merely by arranging contingencies of reinforcement, for suitable forms of response will never be emitted to be reinforced. Some other process must be at work. One way of avoiding the necessity of waiting for the proper form is to use a method of progressive approximation. We first reinforce almost any verbal form; later we insist upon more and more of the precise fulfillment specifications. This is the method by which one develops complex behavior in animals, and we have noted that it is often used in building an echoic repertoire.

When such a repertoire has once been made available, the

problem of instruction is enormously simplified. An echoic response may then be evoked and reinforced in other ways. If we wish to teach a child the name alligator at the zoo, we need not wait until a response of that form appears - or even an approximate form. We simply evoke the echoic response when the alligator is present and add a special measure of generalized reinforcement. The alligator then acquires some control over the response as an example of a very important relation to be discussed shortly. The same process goes on outside the field of deliberate instruction. We pick up a significant part of our vocabulary by echoing the behavior of others upon appropriate circumstances. The net advantage of having such responses available upon future occasions is perhaps one of the continuing reinforcements of echoic behavior.

Another type of verbal stimulus which controls specific forms of response is a text. The same relationships prevail: the text is a discriminative stimulus in the presence of which a certain form of response will be followed by a generalized reinforcement. Many other processes take place in the behavior of the reader, as we shall see in a later lecture, but all that is involved here is the verbal response itself, as previously defined and as exemplified in the case of echoic behavior. Since "reading" usually refers to all the behavior of the reader, a narrower term is needed. The term "textual response" is easily understood and does not imply any process which is out of place here. In textual behavior, then, the form of response is determined by a visual record of verbal behavior. Writing and printing naturally come first, but a tactual text, as in Braille, could be analyzed in the same way. The only qualification is that a text must not have the auditory pattern which is covered by echoic behavior.

The evidence for verbal behavior of this sort in literate persons is obvious. But here again being "able to read" must be translated as being likely to read under certain circumstances. We are not dealing with a capacity but a tendency - the tendency which makes us read not only letters and books and newspapers but also unimportant labels on packages, subway cards, and billboards. Reinforcement for behavior of this sort, as in the echoic case, is first educational. Some interested person bases a generalized secondary reinforcement upon verbal responses which stand in a particular relation to the marks on a page. If the child responds cat in the presence of the marks CAT and not otherwise, he receives approval. Later, an abundant automatic reinforcement arises in the advantage of being able to read. The primitive case of automatic reinforcement is seen in the behavior of the young reader who must pronounce a word before reacting to it in his capacity as listener. A short circuit may eventually arise between the text and non-textual processes in the reader, in which case the textual response here being considered may drop out. Difficult material usually reinstates it.

It seems idle to point out the importance of textual responses in the development of competent verbal behavior. The presence of book stores and libraries near any educational institution proves that there is some connection. But the mode of operation needs to be analyzed. Just as echoic behavior enables the instructor to evoke a response at an appropriate moment in order to reinforce it in some other connection, so books evoke

verbal behavior in connection with other events, verbal and non-verbal, and in so doing enlarge our verbal repertoires. What actually happens in such a case can be more conveniently discussed when we take up the behavior of the listener and reader.

No innate tendency to read has been seriously proposed but the parallel between textual and echoic behavior is quite close. Both the auditory and visual stimuli have the same kind of controlling effect over the form of response. The difference which arises because echoic behavior is formally similar to the stimulus involves two relatively unimportant points, so far as the nature of the relation is concerned.

One of these is the question of the smallest possible unit. Whether it is best to set up a textual repertoire of small phonetic responses or of larger units is a question of instructional procedure which has been long debated. We shall not need to answer it. In either case the reader comes to possess functional textual units in the present sense of various sizes. The growth of a phonetic repertoire when instruction is at the level of the word may be slow but, as in the echoic case, it seems to take place. It naturally comes to a forced stop at the phonetic level, if the text is phonetic. There is no possibility of the smaller grained units of mimicry toward which the echoic case tended. And units of intonation, accent, and so on, can scarcely develop if the text does not represent these properties of verbal behavior.

The second special consequence of the formal similarity of echoic behavior is the possibility that automatic reinforcement will sharpen the form of response in addition to increasing its probability of occurrence. As we echo verbal behavior we come closer and closer to the form we hear. In textual behavior the automatic reinforcement derived from reading merely increases the likelihood that we will read in the future. It does not differentially reinforce correct forms. Mispronunciation is one consequence of excessive textual behavior. When a child responds textually with a deviate form and then changes to a correct form which "makes sense" - a process which will be discussed elsewhere - some corrective reinforcement is automatically received. But it is very much more lax than the shaping effect in echoic behavior.

We have not exhausted all the possible combinations of verbal stimuli and verbal responses, for responses may be in written form also. The principal problems have been covered, however. When the stimulus is vocal and the responses vocal, the behavior is echoic. When the stimulus is written and the response vocal, the behavior is textual. When the stimulus is written and the response is written, we have a sort of written echoic behavior. Just as the unit of response in vocal echoic behavior approaches the units of mimicry, so the units in this case approach the units of drawing. Onomatopoeic responses are matched by pictographs. When the stimulus is vocal and the response written, the behavior is called taking dictation, and the problem of the unit of response must recognize stenographic practices. All of these cases frequently involve processes not concerned with the simple emission of a verbal response, but the functional relations here defined and which we shall use in accounting for larger samples of verbal behavior are of this simple sort. In both echoic and textual behavior we have simply identified and accounted for relations

by virtue of which certain verbal responses tend to be emitted upon certain identifiable occasions.

These relations are sometimes dismissed as spurious. Behavior of this sort is not important to the theorist of meaning because the correspondences between the response and the controlling variables do not raise the problem of reference. If there is any semantic problem at all, it would appear to be between the response and the source of the verbal stimulus. But no effective functional relation is unimportant. By far the greater part of normal verbal behavior involves both echoic and textual responses, as we shall see. The danger of dismissing a relation because it is not meaningful according to some preconception of meaning is shown clearly in the case of the type of verbal response to be discussed next. Most semanticists also treat it as spurious, and thereby throw away a chance to solve some of their most critical problems.

In this type of verbal response the prior controlling stimulus is also verbal, and the response has a different form. There is therefore no point-to-point correspondence between stimulus and response as in the echoic and textual cases. For this reason we need not ask whether the stimulus in a particular example is vocal or written. When either is mentioned, the other is implied.

The relation has been extensively studied in the word-association experiments where emphasis has been upon diagnosis in terms of individual differences in response tendencies. We shall return to these matters later. Here we are interested in the broader application to normal behavior. Some verbal responses can be accounted for only by appealing to a causal relation to prior verbal stimulation, arising from the behavior of either the speaker himself or other speakers. Let us call a response which is controlled by a prior verbal stimulus of different form an Intraverbal Response. We have then to ask, how much of what one says is intraverbal, and what is the nature of the intraverbal relation?

Behavior of this sort is obviously extensive. How are you? is the stimulus for Fine, thank you, and many social formulae show no other sort of controlling relation. Small talk is largely intraverbal, as is serious conversation, though it is not so obviously nothing else. Why? is the stimulus for Because (tout court) and a question is frequently the stimulus for an extended response which seems to have no other controlling variable. The completion items on an objective examination stimulate intraverbal responses in much the same fashion as a word association blank. Verbal stimuli for such responses also arise from one's own behavior. When a long poem is recited, we can account for the greater part of it only by supposing that one part controls another. If we interrupt the poem, the control may be lost. The alphabet and the cardinal numbers are acquired as intraverbal responses, as are also the multiplication and other mathematical tables. The facts of history are retained almost entirely in the form of intraverbal responses, as are many of the facts of science even though responses are here also frequently under [another kind of control to be discussed later.][†] Standard word orders characteristic of a given language and the proper disposition of grammatical tags are intraverbal. Dead

metaphors survive by virtue of the intraverbal relation; in the expression as bold as brass, no other determiner of brass is apparent. Literary allusions often have only an intraverbal origin. The ultimate effect in the control of one's own verbal behavior is seen in the train of responses in free association - or, as we call it in the case of a train very much unlike our own, verbigeration.

We do not simply infer that such material is intraverbal because it cannot be anything else. We can show the effectiveness of the intraverbal relation in many ways. The obvious fact that a speaker can behave verbally when no other sort of determiner is available is the primary datum. But the lawfulness of the relation can be demonstrated in the case of specific responses as in the word association experiments. The data in such experiments are something like a by-product of the various relationships which obtain outside the laboratory. These relations can also be used, and conversely their effectiveness can be confirmed in combination with other relations.

The reinforcement which establishes an intraverbal relation is often quite obvious and specific. The paradigm remains the same as in echoic and textual behavior: a verbal stimulus is the occasion upon which a particular form of response will receive some sort of reinforcement. Classroom recitation is a case in point. The right answer is the response which is reinforced upon the verbal occasion created by the question. In accordance with a well-established principle in non-verbal behavior, the answer becomes more likely to be emitted when the question is asked in the future. In reciting a poem or in giving a long account of an historical episode, each segment of the verbal behavior (and we need not specify the size) is the occasion upon which the next segment will be reinforced as correct.

Educational reinforcement of this sort may set up single intraverbal correspondences, as in the multiplication table. But memorized poems establish many different connections with the same verbal stimulus. There is also a non-educational reinforcement which increases the variety of responses under the control of a single stimulus. The word association experiments show the result. In a given verbal community many different responses are under the control of a given verbal stimulus.

The intraverbal relations in any adult repertoire are presumably the result of thousands of reinforcements under a great variety of conditions. Occasionally a particular set of correspondences may predominate, in which case an individual pattern will emerge in the word association tests. But in general we have no way of predicting what the net result will be, for there are too many different sources to be taken into account.

In the early work on word association some sort of order was sought among the associations obtained in a given verbal community. The associations were supposed to represent various thought processes. Jung, in his famous *Studies in Word Association*, used a complex system of classification from which the "psychical relationships" were to be "reconstructed" - albeit with caution. Nearly fifty subclasses were distinguished. For example, if the verbal stimulus lake yielded the response sea, the

relation was an example of Coadjunction; if tree yielded beech tree, it was Subordination; if cat yielded animal, it was Supraordination; if pain yielded tears, it was Causal Dependence; and so on. But the conditions of reinforcement which are responsible for intraverbal behavior do not lead us to expect that such a logical classification would have any functional validity. We may assume, on the contrary, that when two verbal forms occur close together in normal discourse they will acquire an intraverbal connection. The exceptions will be demonstrable cases of specific relations, especially where the forms have a limited currency. And even so, the relation in such a case is merely that which prevailed upon the particular occasion, and it probably was not a logical relation.

The results of the usual word association experiment may reasonably be accounted for with this assumption. The clang associations, involving similar formal elements are either echoic or textual responses depending upon whether the stimulus is vocal or written. All the other relations appear to approximate the frequencies of contiguous usage. The form sea is likely to occur in the context of lake, animal in the context of cat, and tears in the context of pain. If the logical or causal connections are functional anywhere, it is in the physical world in producing these contextual facts. So far as intraverbal behavior is concerned, contiguous usage is a sufficient explanation.

The force of contiguous usage can be demonstrated by studying responses to verbal stimuli containing more than one word. The stimulus red may yield green, blue, color, and many other responses with considerable frequencies. White will yield black, snow, and so on. But the verbal stimulus, red, white will yield blue in preference to any other response. It is a specific occasion upon which the response blue is frequently made and reinforced. Similarly an expression like That has nothing to do with the will produce case or one or two other forms to the exclusion of all others. Two, four, six, eight will produce ten. The more specific the verbal occasion, the stronger the control over a single response.

Training in science, logic, and mathematics consists in part in establishing strong restricted intraverbal responses. The experiments of Sells in connection with what he calls the "atmosphere effect" dealt with the conflict between the logical specification of a correct conclusion and the disposition toward a conclusion arising from common intraverbal patterns. The trained logician differs from other people precisely because he possesses strong and effective intraverbal responses in the field of logical thinking. One of the chief purposes of a reduction to symbols is to avoid interference from the chaotic intraverbal reinforcements of everyday discourse. But these matters may be more appropriately considered when we discuss verbal thinking.

A unit of intraverbal response may be smaller than the word, as in learning the alphabet or in acquiring an acceptable use of grammatical tags, or it may be composed of many words, or perhaps even a stress pattern extending over many words. In any event, the total number of connections in an adult repertoire is very great. It exceeds the number of different responses, and

the larger units are not composed of, or identical with, the smaller. Except for the specific intraverbal linkages which are found in limited areas of human behavior, there is no intraverbal "vocabulary" corresponding to the basic repertoires of echoic and textual behavior. This is shown by the fact that appropriate responses cannot be made to new verbal stimuli. Some response may be made, but there is little or no effective connection with other units. There is no real transfer. By studying what are essentially intraverbal responses to novel verbal stimuli, E. L. Thorndike has shown the absence of any general tendencies in normal behavior. This was even true for an international language which was supposed to make a mnemonic use of such relations.

Echoic, textual, and much intraverbal behavior has the appearance of verbal behavior of a sort to be discussed shortly, in which the response is determined by some state of affairs in the nonverbal environment. The reason for this is obvious. The original verbal stimuli were of this sort, or at least they were responses to stimuli which were, or to stimuli which were responses to stimuli which were, and so on. Ideally we ought to be able to trace any verbal pattern back to a relation with a nonverbal state of affairs, which is, of course, the most important relation from the point of view of the contribution of verbal behavior to human affairs. In the case of echoic and textual behavior, it is usually obvious to a third person, C, that B is responding verbally in a particular way because of the prior verbal behavior of A, or traces left by the behavior. But the intraverbal case is not so obviously controlled by a verbal stimulus, because of the lack of a point-to-point correspondence, and we are likely to try to interpret it as a response to nonverbal states of affairs. The semanticist supposes that the word Caesar refers to Caesar, dead though he has been these two thousand years. In any contemporary speaker, a response of this form is probably intraverbal. A process of educational reinforcement has brought the response under the control of various sets of verbal circumstances, because of which the speaker makes sense, or doesn't, in emitting the form Caesar. Theoretically, we should be able to trace the response back to an instance in which the response was made to Caesar as a man. The study of history assumes valid chains of this sort. The use of primary sources is a way of avoiding unduly long, and probably faulty chains. But the verbal behavior of the contemporary historian is mostly intraverbal. A response (Caesar crossed the Rubicon) appears to be controlled by the nonverbal state of affairs which existed when Caesar crossed the Rubicon, and is so treated in most semantic systems, but it must be described in a scientific account as intraverbal (if it is not, indeed, simply textual). If we exclude pictures, statues, impersonations, and so on, there is no "referent" for Caesar in the behavior of the contemporary speaker. The semantic relation, like the psychical process in the word association experiment, is operative, if at all, prior to any of the events now considered. The relation may explain the ultimate source of the pattern of the historian's behavior, but it does not explain the behavior.

In summary, then, whenever a verbal stimulus acts upon a speaker we expect some measure of control. Some of his responses may show a point-to-point correspondence with verbal stimuli, when the behavior is echoic or textual, or they may be formally unrelated but nonetheless determined, when they are intraverbal.

Verbal stimuli do not have an all-or-none eliciting effect; they simply make certain forms of response more likely to occur. This is the fact which we use either to control verbal behavior, as when we wish to generate a particular response, or to interpret behavior which we have merely observed under verbal circumstances.

Let us turn now to non-verbal stimuli. We find two principal types. One of these is the all important case toward which we are slowly working, in which the speaker is talking about the world of things and events. But this we may save till last.

The other type of nonverbal stimulus may be called an audience. The term may be understood to include the people to whom one not only speaks but also writes or gestures. The effect of verbal behavior upon an audience will be considered later. Here we are concerned with the effect of an audience upon verbal behavior. The relation is of the same sort as in the three types just discussed: an audience is a discriminative stimulus acting prior to the emission of a response. It is an occasion upon which verbal behavior of certain forms is likely to be reinforced. But the relation is complex. A single audience increases the probability of reinforcement of a large group of responses. We have to account for the composition of these groups, and for the effectiveness of different audiences in controlling different groups.

The functional relation between an audience and verbal behavior scarcely needs to be proved. If an audience disappears, verbal behavior generally comes to an end. The audience need not actually walk out. It may be cut off. We stop talking over a dead phone - as soon as it is seen to be dead - or when a deafening noise interferes with face-to-face transmission. We wait for laughter to subside, and if our audience is distracted we attempt to recapture it with an appropriate mand - the vulgar Hey! or Listen! or the authoritative Attention! Even though we possess behavior in some strength, we remain silent until an audience appears. The problem of getting someone to respond verbally is often the problem of creating a suitable audience. When a publisher asks a writer to write a book, or a university appoints someone to a lectureship, the effect in evoking verbal behavior may be mainly due to the audience which is supplied - a responsibility which I hope you will not take too lightly.

An audience is practically always an additional, variable, but this is characteristic of verbal behavior, which is generally the product of several variables operating at once. The audience does not determine the precise form of response, and hence may seem to be less important than variables which do. But some audiences are effective in evoking behavior with a minimum of formal determination, just as formally determined behavior is sometimes emitted without an audience. The usual case is a combination of variables.

The audience variable would be of little interest if a single audience controlled all the verbal behavior of a given speaker. But this is not the case. Groups of verbal responses come to be controlled by special audiences. The appearance of an audience strengthens a given group of responses, and a change in

relative strengths of response. The following kinds of special audiences may also suggest different subject matters in certain cases. But the only principle here being illustrated may be put in this way: it is assumed that there are alternative responses controlled by a given situation and that the audience is the deciding factor with respect to which form will be evoked.

The best examples of special audiences are those appropriate to the languages - English, French, Chinese, and so on. The polylinguist emits forms which are effective in a given verbal community of this sort, because of the very obvious differential reinforcement which follows. A Chinese audience is an occasion for the effective emission of Chinese. Within a single language community there are special audiences. Certain forms may be appropriate to, and differentially reinforced by, listeners of special social levels or standing in special relationships with the speaker. Jargons, patois, cants, and technical vocabularies are other examples. Some of these, like scientific vocabularies often deal with special subject matters and as such are not alternative languages, but when a scientist talks about the low tensile strength of a worn shoelace he is speaking a sub-language in the present sense. There are also the little languages (hypocorism) with which we talk to children. These often survive between friends into adulthood. A famous example, of course, is the little language with which Jonathan Swift wrote the Journal to Stella with its oo, zis, and im and its deelest logues for dearest rogues. And we have also to consider the special audiences which must be blamed for bookish, pedantic, poetic, literary, archaic, polysyllabic, and genteel vocabularies. Not to be entirely forgotten are the animal audiences. We mand the disappearance of a cat with Scat! of a fly or chicken with Shoo! and of a dog (sharing our human dignity) with Go away! or Go Home!

These are all classes of verbal responses which are controlled, as classes, by various audiences acting as stimuli, prior to the emission of verbal behavior. To add to the richness of the resulting phenomena we shall see that verbal behavior is sometimes under the control of two audiences at once, as in irony, or is forced to take a given form because of the positive action of one audience and the negative action of another.

The appropriateness of an audience is an important factor in the determination of behavior. The clinician, particularly the psychoanalyst, establishes himself as a particularly favorable audience in order to evoke significant behavior. The control is often so great that behavior is evoked which the speaker himself is surprised to hear. There may be a comparable effect in finding someone who speaks one's language - one's native tongue in a strange land or a special sub-language in a given community. As we shall see later, one way to encourage one's own verbal behavior, as in literary composition, is to find the right audience.

The variable is difficult to handle in both predicting and controlling behavior because its physical dimensions are elusive. In this respect it differs greatly from the verbal stimuli already considered. We generally know when a verbal stimulus is present, but the speaker must often learn to what sort of audience he is speaking. He must discover that someone doesn't speak English, or does not respond appropriately to a certain kind of slang, and so

on. The audience-value changes from person to person and in the same person from time to time. There is no permanent external mark.

It is even more difficult to locate or control the audience variable when the reinforcement is to be supplied by someone at a distance. What audience is actually controlling the verbal behavior of the letter writer? There is certainly very little effective prior stimulation. Perhaps this is why letter writing tends to be poorly determined, as we have already seen. The physical presence of a friend exerts a much more powerful control. Something is achieved, of course, merely by putting Dear Joe at the top of a page; some of the classes of verbal behavior appropriate to Joe are thereby strengthened. And would-be letter writers often resort to other measures. A picture or other memento is said to help.

But the stimulus need not be an icon. A given situation in which one repeatedly writes to a friend may suffice. Another supplementary stimulus may come from the writing itself, once the letter has been begun. A paragraph or two, once written, has the same functional connection with a special vocabulary as a physical audience, although we should now classify it as Textual or Intraverbal. The effect is especially evident in shifting from one language to another. A sudden change to a French-speaking listener will not bring a complete French repertoire to full strength except in the very competent bilingualist. There is a slow growth of an appropriate vocabulary due to self-echoic and intraverbal processes. The deferred audience of the professional writer is physically represented in the same way, insofar as it is represented at all. The troubadour stood in a much better relation to his audience. The invention of writing and printing made story telling difficult. Some of the practices with which writers encourage their own verbal behavior consist in establishing something which corresponds to an audience. The almost magical effect of writing in the same place at the same time of day and every day (a practice which Anthony Trollope recommended and scrupulously followed) can be interpreted as building a sort of conditioned, albeit inanimate, audience.

Some help in solving the problem may be found in the possibility that the speaker or writer may be his own audience. The special effect which such an audience has upon behavior will be noted later. It is of no help, however, to appeal to images of the person to whom one is writing, for what are the causes of the images? If any momentary reminder can be discovered it will serve as well as a determiner of verbal behavior. Seeing a person is an activity which is cognate with talking to him. Both may be done in his absence, but one is not then the cause of the other. Both follow from common causes and common circumstances. When we clarify the image - see the correspondence more clearly - we may also sharpen and strengthen the audience relationship. An event which brings someone clearly to mind also strengthens the verbal behavior associated with that person as an audience.

The audience relation is another aspect of verbal behavior which has received very little recognition in semantic theories. The effect of an audience may be discussed in passing, but the functional relation does not fit the usual preconception of the relation of reference. The Frenchness of a word does not necess-

arily refer to any French property in what is being talked about, and is seldom allowed for in correspondence frameworks. But the actual relation has interesting possibilities.

In the first place it provides a welcome variation in the formal study of possible correspondences between words and things. When the overlap of multiple audiences or of an audience and another variable forces out a single verbal form, an extra dimension is added to the study of corresponding arrays. It could be handled with the familiar logical device of overlapping circles. But a more profitable use may be made of the relation in solving the problem of the proposition. If we begin with the notion of a proposition[†] as "something which may be said in any language," then, instead of looking for the something, we may ask why there are different languages. The answer is that the verbal environment provides different contingencies of reinforcement because it is composed of different audiences in the present sense. Whatever a proposition may turn out to be as an effective variable in the control of verbal behavior, it is clearly not "free" to be expressed in any form. The form is determined by the audience, and the final state of affairs will be exactly as if there were only one audience and only one expression. But in that case, most writers would be willing to identify the proposition with the verbal response. But we are again anticipating a discussion of verbal thought.

We come now to the all-important case in which verbal behavior is controlled by the physical environment - the world of things and events. By saving this case until last we have been able to get in some valuable practice in handling the fundamental three-term relationship with which it must be described. For the same relation obtains. An object or event is (1) a stimulus in the presence of which (2) a response of given form is (3) likely to be reinforced. A doll is the occasion upon which the small child is given some sort of generalized reinforcement for saying doll. A teleost fish is an occasion upon which the student of zoology is reinforced when he responds teleost fish.

A great deal of educational reinforcement is used to establish behavior of this sort. The child usually passes through a phase in which objects in the environment are constantly named, and in which the names of unfamiliar objects are mandated so that still other responses may be made. Eventually the generalized reinforcement is withheld except upon special occasions. Only those objects which are unusual in some respect or occur in unusual surroundings are occasions for successful responding. The audience variable must often be rather subtly discriminated. But the listener may give some indication that a response will be reinforced. The mand for verbal action What is that? establishes an occasion for the reinforcement of verbal behavior beginning That is... and continuing with a form under the control of a designated object. The designation, as by pointing, is verbal and a part of the mand. Suppose we are assigned the engineering problem of getting someone to emit a given verbal response - say, fountain pen. There are many ways in which this can be done, as we shall see later. The simplest way is to hold out a fountain pen and say What is that? The mand for verbal action motivates the listener; the fountain pen determines the form of his response according to the present relation. The fact is so commonplace

and so obvious that its relevance to our problem may be quite overlooked.

Behavior of this sort might be called "referring to," or "mentioning," or "telling about," or "naming." But there is no common and non-committal word for the response itself, except perhaps "name," and we shall find that this is inappropriate to many kinds of properties and events which enter into the relation. "Sign" or "symbol," like the technical terms of logic and semantics commit us to special systems, and encourage a disposition to consider the response as an objective form. It seems necessary, therefore, to invent another word. Following the suggestion of Sir Richard Paget that we should exhaust the monosyllables first, I should like to propose the form "tact," which is intended to suggest "making contact with." A tact, then, is a verbal response in which the form is determined by a particular object or event which stimulates the speaker prior to the emission of the response. We account for the strength of the response by showing that in the presence of such an object responses of that form are characteristically reinforced in a given verbal community.

The relation between the response and the controlling stimulus is precisely the same as in echoic, textual, and intraverbal behavior, and this must be kept in mind when we say that an object is "referred to" or "described." Except for the greater specificity of the control, we might as well say that an audience is referred to by all responses appropriate to it or the intraverbal stimulus by all the responses it evokes. An echoic or textual response could be said to refer to and describe its controlling variable in the same way. But this merely shows how dangerous it is to continue with the standard terms. The only useful functional relation is expressed in the statement that the presence of a given stimulus raises the probability of occurrence of a corresponding form of response. It is especially important to avoid calling the tact the equivalent of an announcement or a declaration or a proposition, or to say that it states or asserts or denotes something, or that it makes known or communicates a condition of the stimulus. If these terms have any scientific meaning at all, they refer to additional verbal factors to be considered later.

When the tact is the product of a completely generalized reinforcement, it may be said to be "objective" or "pure." A particular audience may select a particular part of the behavior of the speaker, but if a tact is emitted, it is because of some feature of the stimulating environment. But a truly generalized reinforcement may break down. A normal verbal community may supply reinforcements without due regard to the double contingency with both stimulus and response. Forms of response may be particularly effective without strict regard for the stimulus. Flattery is a sort of verbal behavior in which we stretch the tact relation for the sake of greater reinforcement. The behavior may become wholly free of stimulus control, as in the case of fiction, and in a more extreme case it may be "contrary to fact" - it may be not only not under the control of a stimulus, but opposed by behavior which is.

Another sort of deterioration of the tact arises, not because a generalized reinforcement is poorly distributed, but be-

cause a particular response leads to a special consequence in the behavior of the listener. The cry Wolf! Wolf! is established as a pure tact, but it was emitted by the boy in the fable because of the special drive to see men come running. The response had to have the form of the tact; a mand would not have been effective because the necessary motivation on the part of the listener was lacking and could not be generated. As a general rule we resort to the impure tact to evoke behavior which cannot be manded for any reason. In the example of the secretion of tears mentioned in the last lecture, the difficulty is that crying is not voluntary - or, in technical terms cannot be conditioned as an operant. But there is a form of impure tact called the tear-jerker which is emitted, without respect to any connection with a stimulus, because of its effects upon the emotions of the listener.

A more detailed analysis of the breakdown of the tact relation would require more time than we can spare. The effects are in general easy to formulate and to explain by appeal to simple behavioral principles. The behavior of the listener is established in connection with speakers who respect the tact relationship. But such a listener, or a community composed of such listeners, can be, as it were, exploited. Temporarily, at least, it will reinforce behavior which lacks the proper stimulus relation. The conditions are usually unstable, as the fable of the boy who cried wolf shows. Literature, however, is a relatively stable system of verbal behavior in which the listener is willing to condone the lack of correspondence with controlling stimuli. The listener is not exploited because he does not in fact do anything practical in reinforcing the writer and hence the missing stimulus raises no difficulty. But the impressionable people who send gifts to their favorite comic-strip characters might have a legal case. In general, literature is a stable arrangement between writer and reader and it continues to work effectively for both.

The pure tact in which the reinforcement is completely generalized and the control therefore derived exclusively from the environment is perhaps an ideal. But it is closely approached in scientific verbal behavior. Through special instruction and by virtue of sustained practices of one sort or another, the special interests of the speaker are ruled out. He reports upon what he sees, regardless of consequences. One report of an experiment may mean fame and fortune, another nothing. But the report is made according to the facts. This is not necessarily a sign of a superior sense of ethics, for as Professor Bridgman has pointed out, it is characteristic of science that any deviation from an objective response is highly unstable. The speed with which an impurity in the tact relation is discovered by the reinforcing community is probably responsible for much of scientific progress.

Most theories of meaning give almost exclusive attention to the tact relation. It is the case for which their correspondence frameworks are especially adapted. But we must be careful not to be drawn away from a functional analysis by these impressive structures. The problem of "reference" has a fairly close parallel in the present analysis, but it is stated in terms which suggest a different and, I hope, a more effective line of attack. What are the properties which can be responded to verbally in the

world of things or events and what are the responses which they control? The answer would be simple if the world could be divided into so many separate things and events. We could set up a verbal response for each, and this would be a perfectly satisfactory ideal language. But the world is not so easily analyzed - or has at least not been so easily analyzed by those who are responsible for our present verbal behavior. In any large verbal repertoire we find a confusing mixture of functional relations. It is extraordinarily difficult to discover the basic units of correspondence. To make matters worse, we must often lift ourselves by our own bootstraps because many of the properties of nature have apparently only been identified through verbal practices.

This is a problem which thousands of philosophers and scientists have discussed for two thousand years. The net reinforcement has been so slight that we should expect complete extinction of verbal behavior of this sort. But it appears that latent behavior still exists in considerable strength, and if you will consent to be the audience, I will undertake to emit another seven or eight thousand words next week at this time.

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CHAPTER FOUR: Words and Things – The Problem of Reference

We have seen that there are five distinct types of verbal behavior which are under the control of stimuli. They all show the same three-term relation between a stimulus, a response, and a reinforcement. The stimulus, acting prior to the emission of the response, is an occasion upon which reinforcement is likely to be strong. The types are distinguished by the nature of the prior stimulus and its relation to the response. In echoic behavior the stimulus is auditory and verbal, and the speaker eventually acquires a basic repertoire of unit responses by virtue of which he echoes new vocal patterns with skill. In textual behavior there is a somewhat similar basic unit repertoire by virtue of which new texts may be read. In the intraverbal case, exemplified by the word-association experiment, the stimulus is also verbal but responses do not show a point-to-point correspondence with stimuli and there is no basic repertoire. One non-verbal controlling stimulus is the audience, which characteristically controls groups of responses. The various languages, jargons, little languages, and so on, are classes of responses which are differentially reinforced by, and hence later strengthened by the presence of, particular audiences.

In the final case, which we have christened the tact, the stimulus is non-verbal and controls one response at a time, although the basic repertoire has not yet been examined. This relation has been the subject of an enormous amount of semantic and logical analysis. It is the ground upon which practically all theories of meaning are built. It submits to the logical notion of parallel arrays - with words, or parts of words, or groups of words, on one side and things, or parts of things, or groups of things, on the other, with a relation called "reference," or "denotation," or "designation" in between.

In a scientific description of verbal behavior, there is no problem in such a relation itself which does not also hold for, say, the echoic case. If a chair acting as a stimulus makes the response chair probable, and if a cribbage board acting as a stimulus makes the response cribbage board probable, everything is in good order, and we may turn to other aspects of verbal behavior. Certain questions may be raised because of traditional prejudices, but they are easily answered. Is it not true, for example, that the response chair emitted in the presence of a chair differs from the same response emitted because someone has just said chair? Does not the tact chair "say something" about the chair which the echoic response does not say about the vocal stimulus? Is not the relation of reference more than the relation of imitation or mimicry?

It is true that the tact is more useful to the listener, or in general to society. When a speaker stands at a special point of vantage with respect to a given state of affairs, his behavior may be highly important because of the information which the listener may infer. The inference is generally more valuable than when the speaker is emitting merely echoic or textual behavior. Here the listener's inference must go back to the original emitter of the verbal stimulus, and the immediate speaker can almost be ignored. But a relation which is especially useful

is not therefore a different kind of relation.

The feeling that the tact, in addition to being more important, also makes an assertion, and that this is lacking in the echoic case is due to a misunderstanding. The tact relation does not yield any dynamic property or process which does not arise from the three-term relation between stimulus, response, and reinforcement common to all types of responses under the control of stimuli. Later it will be necessary to consider what is involved in assertion, and we shall see that, to put it roughly, the tact is more likely to be asserted than any other relation. But it is not itself an assertion in any sense which would not apply equally well to, say, echoic behavior.

The only point at which the tact differs from the preceding cases is in the nature of the controlling stimulus. This is true by definition, but there are consequences which need to be pointed out. In echoic and textual behavior it is fairly easy to identify the controlling variable. The total range of variation of the class of stimuli called the sound *a* or of the class of non-verbal stimuli called the letter *A* is small compared with the class of stimuli involved in a single tact. This difference is immediately felt when we try to predict or control the behavior. What are the essential properties of the stimulus which evokes the response chair? It is not a new question, even in this form, but it is still unanswered.

We have already seen that the objective and unique relation between stimulus and response in the tact which is so important for science and logic is probably an ideal because it is easily, and almost invariably, distorted by the special interests of the speaker. We now add another difficulty: stimuli are not exactly duplicated upon successive occasions. A verbal repertoire is not like a passenger list, in which one name corresponds to one person with no one omitted or named twice, even though semantic frameworks of the correspondence school variety suggest that this is the case. Various scientific and logical procedures are designed to pin responses down to constant features of stimulating situations. But the very attention which definition continues to receive is perhaps the best proof we could desire that the genius of language is in the opposite direction.

If we teach a child to say *book* when we present or point out a red book, we shall probably be surprised to hear it say *book* when we later present a red horn or a red hat. In our own verbal behavior we have limited the response *book* to a selection of the properties of a particular book, and we forget that the child lacks this experience. The child responds according to the behavioral principle that if a response is reinforced upon a given occasion or class of occasions, any feature of that occasion or common to that class will gain control. There are several ways in which a novel stimulus may possess features in common with a stimulus previously receiving reinforcement, and hence several types of what we may call Extended Tacts.

The property responsible for the effectiveness of the novel stimulus may be the original property in terms of which reinforcements were supplied by the community. This is the case in what might be called generic extension. Thus, we call differ-

ent kinds of chairs chair. The generic property responsible for the extension of the response is the important property for the listener and the response is therefore acceptable. If it is reinforced, the novel stimulus is no longer novel, and the stimulus class is enlarged. In this fashion we eventually come to respond chair to a very large class of objects. To discover the "essence" of chair, we should have to discover the actual contingencies of reinforcement. It is largely a practical problem concerning the uses of chairs.

The object takes priority over a single property in characterizing a stimulus just because of this practical value. Even though the response book had always been reinforced in the presence of "red" and "book," we felt that the child was wrong in emitting the response to the red of a red horn. But single properties show generic extension, too, and may be accepted by the community and reinforced to establish larger stimulus classes. Thus, we extend the tact orange or violet on the basis of color alone. This usage is confirmed by the verbal community and the fact becomes standard rather than extended. When we say that the race is to the swift we designate the important property of those who win races.

This extension does not assume any process or principle of equivalence. Generic spread, as here defined, occurs because of identifiable common properties in the original and novel stimuli. We do not go beyond our fundamental three-term relation of stimulus, response, and reinforcement, but we now note that only a single formulation is much simpler than traditional explanations of the same data, which appeal to various processes of "analogical thinking" by virtue of which the speaker is able to make the transfer. We do not need to say that the speaker discovers a similarity and expresses it by transferring the response. The response simply occurs because of the similarity. As we shall see later, generic extension may take place even though the speaker is unable to respond to the similarity in any other way (or is unaware, as we say, of the similarity).

A second type of extension takes place because of properties which do not enter into the contingency of reinforcement but which are also present during reinforcement. Here the community may be somewhat jarred when the response is made to a novel stimulus, for its inferences about the conditions which evoked the response may be wrong. But a surprising amount of such extended behavior is effective, as we may agree when we note that we are dealing with the familiar process of metaphor.

Traditional accounts of metaphor, from Aristotle on, have generally assumed that it is also a special achievement calling for a special faculty of analogical thinking. Professor Sayce refers to fashion in metaphor by noting that a practical era is generally followed by an epithetic, "when the newly awakened mind and eye seize eagerly upon the analogies and resemblances between things, and when, accordingly, the same attribute is applied to innumerable objects which agree together only in possessing it." (p. 250) But the basic process is still adequately represented by our three-term relation. It is only a matter of the kind of property which gains control of the response. A young girl, upon drinking soda-water for the first time, reported that it tasted

like "my foot's asleep." The response my foot's asleep had previously been conditioned under circumstances which included several important elements: localization in the foot, the relative immobility of the foot, and a certain pin-point stimulation. The properties upon which the community reinforced the response were mainly the first two. But the third, the pin-point stimulation, was more important to the child. When it reappeared as the result of tasting soda-water, the response was emitted.

The fact that this case involves a private stimulus raises other problems but it is an advantage in the sense that we can more easily distinguish between the properties which must have served as the basis for reinforcement and the properties responsible for the emission of the response in the presence of the novel stimulus.

A public stimulus-complex may be analyzed in the same way. Suppose a speaker calls someone a mouse. We account for the emission of the response mouse by noting properties which are common to the stimulating situation in which that response is commonly reinforced and the situation in which that response is now emitted. Whatever these may turn out to be - small size, timidity, or anything else - they are almost certainly not the properties used in a zoological classification or in the practical reinforcement of the response. The example is therefore metaphorical. Our task is simply to account for the appearance of the extended response. In Juliet is the sun we must explain the response sun, since no sun is actually present, and for the same reason we have to account for dollar in bright as a dollar or morning dew in chaste as the morning dew. The stimuli which would account for these responses as unextended tacts are lacking. There is no dollar and no morning dew.

The total figure may contain responses of other sorts. For example, the property responsible for the extension may also be directly tacted. We may say He is timid as a mouse. But if this response is really a tact (and not, for example, intraverbal) the stimulus must contain the elements required for timid because they are precisely the elements responsible for mouse. The response as belongs in another category, which will be discussed in detail later. The form like, also frequently encountered in metaphors, is in the same category. Our explanation of the response mouse is not intended to cover these auxiliary terms.

When a metaphorical response is effective and duly reinforced, it ceases to be primarily a metaphor. It is henceforth emitted on similar occasions as any tact is emitted. A new stimulus class may result, very much as in the case of generic extension except that it now centers around a new restricted set of properties. Thus, if we first acquire the response leg in connection with animals, we may extend it to the legs of tables and chairs on the basis of geometrical or functional similarities, and these properties prevail as the result of subsequent reinforcement. The physiological or anatomical properties of the original class become secondary. The metaphorical origin may have the advantage of sharpening the relation to a stimulus. When we have acquired the response wing in connection with parts of fowl and insects, and of stage scenery and airplanes, and of buildings and armies, the response is available for almost any

kind of work, yet with a fairly sharp reference.

Many apparent metaphors are separately acquired from the verbal community. The response leg when evoked by the leg of a table does not represent metaphorical extension in the current speaker. Bright as a dollar is a metaphor only if dollar has been independently established as a response where the property of brightness was not emphasized. In ordinary usage the expression is little more than a polysyllabic synonym for bright. Dull as ditchwater is a more convincing case because ditchwater is not now often acquired in connection with ditchwater, nor is the property of dullness very conspicuous even so.

Apparent metaphors are, as we should expect, often peculiar to a given verbal community. We do not expect to find a parallel expression in every language. They are essentially idioms. Bright as the sun, though probably commoner than dull as ditchwater, is not an idiom because of its very probable spontaneous metaphorical origin. Any response which, though apparently close to a metaphorical origin, is still bounded by a verbal community, is presumably not the result of metaphorical extension. For example, as Bloomfield has pointed out, the expression eye of a needle is lacking in both French and German, though it might arise as a metaphor in either case. The response in English must be attributed largely to special reinforcement in connection with needles, rather than under the usual circumstances related to the organic eye.

Some trace of a functional extension may exist, however. As we shall see in the next lecture, a verbal response acquires strength from more than one variable. Hence it is possible that the idiomatic response eye of a needle will be supplemented by extension from the response to the organic eye. As a result (1) the response will be more readily acquired when a needle is first seen, (2) will be more readily made upon every occasion, and (3) will in the long run hold its own against competing responses and survive in the language.

It has often been pointed out that in metaphor the new and unfamiliar is expressed in terms of the old and familiar. This follows from the present interpretation, for the case is defined as an old response to a new stimulus. What properties of things and events serve as the basis for extending a response is a question for empirical study. In by far the greater number of instances the similarity in the two situations is obvious. By surveying the kinds of responses which frequently enter into metaphorical expressions we can get a fair suggestion of the kinds of stimuli which commonly occur in the verbal behavior of the speaker. This principle has been used by Miss Spurgeon to reconstruct a sort of topical biography of Shakespeare and other Elizabethan figures. What Miss Spurgeon calls Shakespeare's Imagery is metaphor according to the present definition. If a situation simply evokes the non-extended tact appropriate to it, we can learn nothing about the other verbal behavior of the speaker. But in metaphor a response is evoked which has been acquired under other circumstances, and the latter can to some extent be inferred from the particular extensions made. Metaphorical responses are not so tightly bound to the present situation and are hence freer to reflect the idiosyncrasies of the

speaker.

We can apply the same principle to the metaphorical behavior of a verbal community. The results will have fewer idiosyncrasies and be less interesting than the individual case, but they are none the less relevant in supporting the present interpretation.

Consider, for example, the metaphorical responses which serve in place of, or as a supplement to, the response bright. These are emitted upon a given occasion in the presence of a bright object. But they were first evoked by a wide variety of bright stimuli of other sorts. Otherwise we should have no metaphor. We can therefore make a list of the commonest bright objects by simply going through the heading bright in a dictionary of similes. In one such dictionary, widely sold for purposes of verbal ornamentation, the following rough count was made. (The figures do not show frequencies of usage, of course, since only one instance of each metaphor is listed.) There are about fifty similes beginning bright as and continuing with heavenly phenomena, particularly the sun and stars. Sixteen other similes refer to light reflected from water in some form. Five refer to artificial sources, like beacons or lamps, and seven to reflecting surfaces. Nine refer to objects of art. The flora and fauna of brightness include humming birds' diadems, glowworms, peacocks, lilies-of-the vale, poppies, and a new blown rose. There are other kinds of responses in such a list which cannot be accounted for in this way. For what can we say of bright as joy or bright as Apollo's breastplate or bright as night is dark? Here we must suppose that the response bright is followed by an intraverbal response which has acquired strength on some particular occasion or because of some net contiguity of usage. The present situation strengthens bright and bright in turn strengthens night and dark. These "comparisons" are not metaphorical extensions at all but intraverbal responses which fill out the standard form as ... as or like.

As in the case of the magical mand, we may note that many of these responses would never have been emitted except under the special encouragement of the literary process. That is why literature provides so many interesting data in the verbal field. We do not, of course, have all the information we should like to have to interpret a literary work, but in the present case it is a plausible assumption that the writer was faced with an object possessing the property of brightness, that he was strongly motivated to say something about it, and that he had either forbidden himself to make the response bright or had already made it without getting much of an effect. His behavior had a sort of blanket strength, but the form of the ensuing response was weakly determined. Only a poet would emit some of the responses I have just listed, but all of us would tend to emit many of them. That is why we read material of this sort with pleasure, as we shall see. We take advantage of the fact that the poet or prose writer exposes the subtler tendencies in verbal behavior.

Even the non-poet emits many rather feeble responses for the sake of metaphor when the blank form as ... as acquires currency as an intensifier of the included response. Instead of saying He was very stupid we may say He was as stupid as

The response which follows may be very weakly determined. If no similarity will serve for a metaphorical extension, the completion must be left to an intraverbal response. If there are no available intraverbal responses, or if they are taboo or unavailable for any other reason, a stock form must be resorted to: He was as stupid as you could well imagine or ... as I don't know what.

Any similarity between stimuli which can be expressed in the terms of physical science or any intraverbal relation suggested by contiguous usage, may be accepted as a reasonably sufficient explanation of a response at the present time. But does a process of extension take account of other kinds of similarities? The psychologist is familiar with this problem under another guise. How can we explain functional similarities or similarities in different sensory departments? Here it may be necessary to say that two stimuli arouse a common prior process in the responding organism and that this mediates the extension of the verbal response. When Romeo exclaims Juliet is the sun! no physical properties are available for an explanation as in the expression bright as the sun. Only to Romeo did Juliet glow with the light of dawn. And when the color scarlet is described as like the blare of a trumpet, it must be because some common effect precedes and mediates the extension of the response.

We are by no means ready to undertake a rigorous analysis of complex metaphors. What were the actual similarities which led Coleridge to speak of Wordsworth as "under full sail" when he was quietly at work on the Prelude? What are the similarities between the links of a chain and a series of events arranged in time which prompt the expression a "chain of events." Where is a man when he is standing "high in the world" or when he suffered "a moral fall"? How do we shut our eyes to the truth? These verbal practices need to be studied, not only for their bearing upon a science of verbal behavior, but because they are closely associated with other psychological processes - with the techniques of dreams and myths, for example, as Freud has very well shown.

Verbal Behavior would be much less effective if it lacked metaphorical extension. Even when a non-extended tact is available, the metaphor may have an advantage. It may be more familiar, and affect the listener in other ways, particularly in the field of emotion. But it is most useful when no other verbal response is available. In a novel situation to which no generic term may be extended, the only effective behavior must be metaphorical. This follows from our formulation. The widespread use of metaphor in literature is due to the fact that literature is pre-scientific. It talks about things or events before science can stop it. And it builds its vocabularies, not through explicit definition, but through metaphorical extension.

Nowhere is this better illustrated than in the field of psychology itself. Human behavior is an extremely difficult subject matter. The methods of science were applied[†] to it very late in the history of science as a whole, and the account is still incomplete. But it is the field in which literature is competent, secure, and effective. Many psychologists prostrate themselves before the achievements of a Dostoievski, a Jane Austen, a Stendhal, a Melville, a Tolstoi, a Proust, a Joyce. Here is an understanding of human behavior which has never been achieved

with the methods of science.

In so far as literature simply describes human behavior at a narrative level, it cannot be said to understand it all. But good literature seems to do more than that. It says something about human behavior. It interprets and analyzes it, apparently at the same level of discourse as a scientific account. A person is not only described as he takes part in various episodes, he is also somehow characterized - a significant expression. This is where metaphor, as a pre-scientific vocabulary, finds its place. Personality, for example, is described and analyzed with a well-defined typology. In early literary forms, animals are used as a classificatory scheme. Professor Wells has compiled a useful list of these theriotypes - a man may be an ass, or an owl or a snake or a rat. No scales have been worked out for these traits, but they are used with very little confusion in literature as well as casual discourse.

The familiar animals are, of course, rather quickly exhausted, but literature builds its own prototypes. It was not long before the writer could deal effectively with "those virtues," as Thomas Carew put it, "for which antiquity hath left no name but patterns only, such as Hercules, Achilles, Theseus." When we say that a man performs a Herculean task, we do not say simply that the task required great strength, or that it was undertaken industriously, or that it was possibly odious; we say all of this and more - in a single word. Fable, myth, allegory, and literature in general create their own vocabulary by connecting names with particular events or occasions, from which they may then be metaphorically extended.

This practice works outside the field of personality and in much the same way. A very complex interpersonal relation can be described as dog-in-the-manger or a complex emotional adjustment as sour grapes. What is that essential property responsible for the transfer of the response from the fable to the present situation? It does not matter whether we can answer this question or not. Perhaps science has not caught up. The metaphor still has an advantage because it would take a long sentence, and more likely it would take a chapter, to deal with a matter which the writer and most of his readers dismiss for these purposes with a word.

But what are these purposes? Why are metaphors effective, and what do they achieve? The distinction which we drew between a practical property of the stimulus which enters into a contingency of reinforcement and an adventitious property [corresponds to the distinction between generic and metaphoric extension.][†] The generic extension respects the basic contingency, which then persists in the verbal community. The listener may act with respect to the speaker's behavior as if the response had not been extended. Some metaphors are also effective in this way and are subsequently reinforced with respect to a new property. In that case they are no longer primarily metaphors. It may be possible, for example, to define the Apollonian or Faustian soul in such a way that the metaphor vanishes, and the terms become useful in straight description. This takes all the metaphorical force out of the heroic virtue and gives us no clue as to what is happening when the terms are used metaphorically, but it leads to a non-metaphorical terminology appropriate to the field of human personality. The scientific effectiveness will derive from the new

contingencies of reinforcement, not from the metaphorical origin.

The difference between the unextended or generic tact and metaphor is the difference between science and literature. Scientific verbal behavior is set up and maintained because of certain practical consequences for the listener. Nothing beyond a generic extension will eventually serve. In literature there are no practical consequences of this sort and hence metaphorical extensions may prevail. No one will deny their effectiveness in many cases. But what the effect is, what happens when we read Dostoievski or Joyce and in what sense we can share their knowledge and understanding of human nature, is another matter. We can discuss it to better advantage after we have considered the behavior of listener and reader.

There are other kinds of extended tacts. Metaphor, as used here, includes similes and several other minor variations distinguished by classical rhetoric. But a separate category is needed for what is called metonymy. The type is defined by the fact that a stimulus acquires control over a response because it frequently occurs as an accompaniment of a stimulus which already controls it. Thus we say "The White House denied the rumor" although it was the President who spoke, or "You haven't touched your dinner" when the important fact was that the dinner was not eaten. We account for such behavior by noting that the President and the White House frequently occur together as do touching and eating a dinner. Classical rhetoric reserved a special name - antonomasia - for the case in which the original control was already metaphorical.

The metonymical transfer is not freely made in both directions. We do not say that President Garfield received a new coat of paint. An effort has been made to explain this fact in terms of the logical relations between stimuli which have metonymy. The relation may be that of ownership, or of part to whole, and so on, and various types of metonymy have been defined accordingly. But these relations, like those appealed to in the classical analyses of word associations merely explain why the stimuli are contiguous in nature. They do not account for the verbal result. We may suppose that any two contiguous stimuli will show this effect without prejudice. That the transfer does not occur in every direction may be explained in another way. Metonymical extension, compared with metaphorical extension, is loose and often ineffective, and it frequently leads to confusion on the part of the listener. Only those extensions will be effective which do not lead to conflicting results. We can generally use the part to refer to the whole, as in the textbook example a fleet of twenty sail because the listener will undoubtedly suppose that the rest of each ship was also there. But we cannot say that the ships were flapping idly in the breeze without producing additional and inexpedient effects.

There is actually very little spontaneous metonymy. The examples in everyday speech or in literature, like many apparent metaphors, are generally responses which have been independently reinforced. Metonymy may explain the origin in the verbal environment, but not each instance in the behavior of the individual speaker. The spontaneous process is of little value in supplying an effective new vocabulary when the standard vocabulary breaks

down, because the controlling property is too loosely associated with the property respected by the reinforcing practices of the community.

Responses which are strengthened because of adventitious connections with reinforcement enter into verbal behavior in another way. It would be foolish to deny the effectiveness of contiguous stimuli in the fact of the extensive work which has been done on the subject in psychology. It is well established that when two stimuli occur together either one may evoke a response appropriate to both. It follows, as in the present case, that either one may evoke a response appropriate to the other. The ultimate difference is, as we shall see, that such responses are not generally asserted. A particular dress strengthens a verbal response appropriate to a person who has worn it, but we do not "call the dress by that name." We are likely to say That dress reminds me of so-and-so - an expression that will later be seen to be highly significant. There is a similar appropriate expression in the case of metaphor, but the assertion, though modified, is nevertheless made. The controlling response is more likely to be evident and the response therefore effective.

There is still a more tenuous extension of the tact. It is so useless and confusing that it is described with a set of pejorative terms like malaprop and solecism. The property which gains control of the response (and we must assume that there is control, even though it is faulty) is so far from the defining property upon which standard reinforcements are contingent or similar to that property for so irrelevant a reason that the listener fails to reinforce, at least in full measure. This is not to say that some malaprops or solecisms are not effective. We may get an effect if we say dilemma when a situation is merely difficult, or feasible when it is merely possible. And we shall probably not actually collide with Mrs. Malaprop when she graciously exclaims You go first and I'll precede you. But the net efficiency is reduced. Most verbal environments not only fail to respond effectively, but provide some sort of negative reinforcement[†] for such responses.

The explanation of erroneous responses of this sort is the same as for generic metaphorical and metonymical responses. When a student under the pressure of an examination writes: The fatigue of a synapse is mutual with the refractory phase he later protests that similar to might better have been emitted in place of mutual with, it is not difficult to find common circumstances under which both responses are satisfactorily exchanged. For example, a feeling which is mutual is also similar. Some common function arises in such a case. The distinguishing feature of the solecistic extension is its probable failure in achieving reinforcement or in proving useful to the community.

As in the case of metaphor and metonymy, erroneous responses are often reinforced by a verbal community and acquire a functional, if not a social, status comparable with that of any correct response. The pure mistake, due to an extension of the tact rather than to a separate reinforcement, may be at least as rare as the pure metaphor.

In summary, then, we find that a tact may be extended in

several ways. In generic extension the response is controlled by the property of the stimulus responsible for the standard reinforcement. Both speaker and listener behavior essentially as if the response were not extended. In the metaphorical tact the controlling property differs from the contingent property, but is possibly effective for other reasons. In metonymy the controlling property has merely accompanied the contingent property and resulting responses are likely to be ineffective. In malaprops and solecisms the effectiveness is still further reduced because of an even more tenuous connection. In general, any single stimulus property or collection of properties present when a response is reinforced acquires some degree of control.

The net result is haphazard. Any given stimulus may be regarded as an extension of a large number of stimuli and must be supposed to evoke many different responses. This is opposed to the requirements of practical or scientific usage. How is this natural spread of effect brought under control? The answer is so simple, now that the groundwork has been prepared, that classical treatments may seem almost grotesque. The verbal community simply refuses to reinforce responses which are controlled by unspecified properties of a stimulus.

The process which converts this restricted contingency into verbal practice concerns the same three-term relation of stimulus, response, and reinforcement. But now the reinforcement is contingent up on the emission of the response only when a special aspect of the stimulus is present. The fundamental relation is not changed, and the single property or group of properties specified may be identical with the basis for a metaphorical transfer. It may not be evident upon a single occasion whether the controlling relation is restricted or not. The difference is in the history of the response, and also in its future. When a response has been pinned down to an effective property because its extension to other properties has been stopped by extinction, the extinction implies that the response has been evoked many times. Upon some occasions the contingent property must have been present, upon others not. In metaphor, on the other hand, the extension may take place after one reinforcement or after many reinforcements in the presence of the same stimulus.

The process may not go all the way. Our verbal responses are only more or less tied down to specific properties. Metaphorical extension is weakened but not eliminated. But in the final case a single property or collection of properties, no matter how close the association with the contingent stimulus, is effective. Such a response, and any approximation thereof, we may call an abstract tact.

Abstraction, so defined, does not presuppose any special ability or faculty, although men who have excelled in this line have sometimes claimed special powers. The process is easily demonstrated in animals. Pavlov studied something like it in his conditioned reflex experiment. It was found that conditioned responses could be brought under the control of a single property, or a single complex of properties, of a stimulus if responses to other properties were extinguished. The dog in Pavlov's experiment was not behaving verbally, because the response was not an operant and did not act upon the environment, animate or inani-

mate, in order to receive reinforcement. As we shall see later, the case is closer to the behavior of the listener than of the speaker. But an exact parallel with the abstract tact may be set up in the dog - or for that matter in lower organisms like the rat or pigeon. A pigeon will quickly learn to strike a key only when a given color is present. Some "metaphorical" extension may take place to other colors or to other properties of the stimulus, but a precise control may be set up with the same fundamental three-term contingency. Our definition of verbal behavior includes animal experimentation where reinforcements are supplied by the experimenter. The organism and the experimenter comprise a small but genuine verbal community. This may offend our sense of the proprieties, but there is a happier side. The relation represented in the tact is clearly suitable for laboratory study.

The achievement for which the human intellect may justly take credit is not the ability to respond to a single property of a stimulus, or a special collection of properties, but the creation of a verbal environment which respects more and more subtle contingencies of reinforcement. We now easily react to features of the environment which were not effective in controlling similar behavior in our ancestors. This is not because we are any more perceptive or have any greater verbal ability, but because the contemporary environment forces many discriminations which were not forced by past environments. In studying the present problem the verbal behavior of the speaker is not so important as the contingencies of reinforcement characteristic of a verbal community. This is where the history of a language comes into its own, not because it throws any light on the behavior of the individual, but because we are dealing with a historical fact.

What properties of stimuli are pinned down by the abstract terms of a given language? Are these newly discovered properties or has the process of abstraction merely sharpened a control which already existed? Let us begin with the case in which a single property comes to control a response. The verbal community, let us say, reinforces a response in the presence of a small red pyramid. The reinforcement may be repeated but always in the presence of the same stimulus. Then, provided there is no interference from collateral verbal behavior, the response will henceforth be evoked by any red stimulus, any small stimulus, any pyramidal stimulus, and so on. It is very unlikely that reinforcement will continue to be provided in every case. We could set up such a diverse contingency in the laboratory and allow the response to spread at will, but a verbal community has no reason to follow the spread with its reinforcements. For various practical reasons it will pin the response down to, say, the shape by extinguishing all instances emitted in the presence of red objects, or small objects which are not pyramidal and by reinforcing all instances in which a pyramid is present regardless of color, size, and so on. In this way the abstract tact pyramid or pyramidal is developed.

This is a peculiarly verbal process, for the reason that no non-verbal environment could provide a similar contingency. A single property may be important in controlling a non-verbal response, but it cannot be important in controlling only one re-

sponse (unless it is the sole and inevitable accompaniment of another set of properties). For example, though we may be conditioned to eat only red apples, and hence execute certain ingestive behavior when red is present and withhold it when red is absent, the behavior is not strong when the property of red occurs in other aggregations of properties. We do not eat red books, hats, and so on. We may, as a matter of fact, tend to do this, as may be readily observed in the case of young children, but extinction is bound to occur. There is no single response which we will continue to make with respect to all possible occurrences of red except the verbal response. There are no practical consequences common to all instances of red which supply the necessary contingency.

It may be objected that the verbal community, which is less eventually concerned with practical matters, cannot arrange such a contingency either. But although the community is concerned with red in different ways upon different occasions, it reinforces the speaker's response in the same way. The listener may be concerned with the redness of a stimulus for various reasons, but all that he requires of the speaker is the response red and this is common to all instances. This complex relation, which emerges only in a verbal environment, explains one of the most valuable features of verbal behavior.

The special achievement of the abstract tact in dividing the world into its smallest parts has nourished the belief that abstraction is always or particularly concerned with single properties in contrast with the collections of properties called things. It is contended that the referents of abstract terms cannot stand alone, as objects can, and that this is, in fact, why we have abstractions. But a tact comes under the control of a stimulus-object in exactly the same way. The special status of the tact controlled by a single property arises because a sort of non-verbal abstraction or classification is possible when the stimulus is an object. A single practical response may be made to all instances. For example, we might be able to classify all the objects in the world which we later come to call apples by behaving non-verbally with respect to them. There are typical apple-eating responses, varying with an apple-eating drive. A response of this sort when made in the presence of an apple receives a practical and hence non-verbal reinforcement. The verbal response apple, therefore demonstrates no exclusively verbal process.

The prior consideration which objects receive has often proved puzzling. We usually mention objects first in giving an account of the physical world and historical linguistics has shown that languages tend to develop object-terms first. The slow growth of words related to single properties, for example, color, can often be traced. On the other hand, a logical analysis seems to show that the world of things is built of single-property bricks. The blooming buzzing confusion was presumably composed of chaotic sensory materials rather than an unorganized collection of objects - as in a painting by Signor Dali. Recently, however, objects have received the benefit of a better sense of protocol. Sensations, or the attributes of sensation, now appear as abstractions rather than as primary sense data, and objects find a solid foothold at Carnap's zero level of des-

cription. But all tacts are pinned down, if they are pinned down at all, with the same process. The verbal response chair is as abstract as red. It is not controlled by a single stimulus. Most of the properties of a single chair are irrelevant - the size, shape, material, construction, and so on. The property which is relevant cannot be identified upon any single occasion but only by considering a series of occasions. Many responses of the form chair to unspecified properties have been eliminated through extinction. Perhaps more extinction was needed for the property-term red than for the object-term chair, but that is a function of the particular case. The response insect, though it is a noun and refers to a class of objects, will probably require more differential reinforcement before it conforms to the contingencies in a given environment than the response red.

One special characteristic of verbal responses controlled by single properties is that there is less chance for metaphorical spread and hence less chance of misleading the listener. As Bertrand Russell has pointed out, "When you have said, 'that is white,' nothing in your statement gives any ground for surprise at what happens next." But the matter is only relative, since it depends upon the past contingencies in the two cases. White is not by any means pinned down to a single property. The white race is a rather far-fetched generic extension, and That's white of you is a self-congratulatory metonymical tact in which we act upon the assumption that certain personal characteristics are closely associated with the white race. If I am asked to meet a white man somewhere at three o'clock, I shall not be entirely unsurprised to find someone covered with flour.

Much wasted effort has gone into the search for the referents of abstract terms. The usual semantic framework has seemed to require that something be present upon each occasion when a word was used. But although we should also agree that a property must be present, we do not assume that it can always be identified upon a single occasion. Where the referent is an object, an unwarranted solution is attempted by ignoring the abstract nature of the response and supposing that the object is the referent. Such single properties are often given a sort of object-status as "concepts" or "abstractions." The response red is said to refer to the concept of red or of redness. But these terms obviously belong on the response side of the tact relation. They are not to be found among the stimuli. We never reinforce a response when a "concept" is present. What is present is a stimulus. The so-called referent of an abstract tact can be discovered by noting that many possible variations are compatible with reinforcement but that some feature is constant. We might say that the referent is the class of stimuli defined by this feature, but, as Professor Quine has pointed out, there is little reason to distinguish classes from properties. The property which is correlated with reinforcement must be specified and specified in the terms of physics if we are to remain within the framework of an empirical science. It is this property alone which supplies what Professor Quine has referred to as the "theoretical underpinning of our present ostensible reference to so-called abstract entities."

The great mistake in dealing with abstract behavior is to look for more than a defining property. Our predilection for

things misleads us. We try to assemble other properties in order to compose a thing. This tendency to reify is familiar enough. Professor Richards considers a particularly good example in his Principles of Literary Criticism (p.19). The quotation is from G. W. Mackail's Lectures on Poetry.

"Poetry, like life, is one thing ... Essentially a continuous substance or energy, poetry is historically a connected movement, a series of successive integrated manifestations. Each poet, from Homer or the predecessors of Homer to our own day has been, to some degree and at some point, the voice of the movement and energy of poetry; in him, poetry has for the moment become visible, audible, incarnate and his extant poems are the record left of that partial and transitory incarnation ... The progress of poetry, with its vast power and exalted function, is immortal."

From the point of view of science or logic, this is nonsense. An operational definition of poetry would not support any of these statements. But nonsense is also verbal behavior, and it requires just as much of an explanation as sensible behavior. Regardless of what Professor Mackail thought he was saying, we can interpret the passage in terms of its relevant variables. The central theme is precisely the point I have been making here. What is the referent of the abstract tact poetry? Professor Mackail comes pretty close to the same answer. It is, he says, something which is never quite present in any one stimulus presentation yet characteristic of a long succession of stimuli. But he is desperately concerned with its solidity and durability. Perhaps the fact that poetry is a noun misleads him. A single property is too evanescent; poetry must be a thing. And so word is piled upon word to prove that poetry is both substantial (substance, energy, movement, power, visible, audible) and enduring (continuous, successive, integrated, immortal). These are impure tacts which somewhat reduce one's anxiety lest poetry escape description all together.

The central theme of the passage is easily demonstrated by substituting some other word for poetry. For example, we might search for the referent of the term pyramidal in the same way:

"Pyramidity, like life, is one thing ... Essentially a continuous substance or energy, pyramidity is historically a connected movement, a series of successive integrated manifestations. Each builder of pyramids, from Cheops or the predecessors of Cheops to our own day has been, to some degree and at some point, the voice of the movement and energy of pyramidity; in him, pyramidity has for the moment become visible, audible, incarnate and his extant pyramids are the record left of that partial and transitory incarnation ... The progress of pyramidity, with its vast power and exalted function, is immortal."

The Greeks deified their abstract nouns, but we are scarcely in a position to view that fact with condescension.

We discover the properties of stimuli which control abstract tacts only by empirical investigation. Even when we consider what pyramidity or poetry or chair or red means to us,

we are behaving empirically, albeit with very poor methods. It is a simple problem in the control of verbal behavior. Our formulation shows the line to be taken. Manipulate the stimulus and observe the presence or absence of a response. The concept formation experiments follow this pattern in studying the origin of abstract tacts in an artificial language, and the same procedure is available for an empirical survey of abstractions of all sorts.

We have assumed that an appropriate verbal response is available for differential reinforcement with respect to each feature of a stimulus. A complete account would have to provide for the fact that in many languages fractional parts of standard verbal forms are functionally related to single variables. In English, for example, what is called the root in a family of words is the only part related to a single class of stimuli. The rest of a given response - say, an affix - is usually another fractional unit which can be separately related to another sort of stimulus property. Inflectional, syntactical, and analogical forms follow this pattern. Some common parts of verbal responses are related, however, not to a stimulus property, but to the type of stimulus property involved. The ending -ity on pyramidity, for example, appears on a class of abstract responses where the class is defined by the fact that the controlling variables are single properties.

A survey of all the ways in which combinations of properties in stimuli are related to combinations of properties in responses would require more time than we can spare, and fortunately it is not necessary. The basic principle of differential reinforcement applies throughout, and since we are always concerned with sets of instances, the fact that a fractional response cannot "stand alone" raises no greater problem than the referent of the abstract tact. The difficulty which the grammarian has experienced with forms of behavior which will not "stand alone" can be avoided. Another point of advantage may be mentioned for future reference: the unit of response which emerges may be smaller than the word and even smaller than the so-called morpheme. The test of functional significance of any element of the behavior of the individual speaker is independent of the historical continuity of the form or its distribution of behavior in a verbal environment as a whole.

From the nature of the process we must suppose that abstraction does not create the control exerted by a stimulus but simply sharpens and intensifies it. Some abstracted properties are so subtle that they would probably never lead to spontaneous metaphorical extension, but this is merely a difficulty in detecting the spontaneous tendency. And if a verbal environment comes to establish verbal behavior with respect to the properties of nature which were not respected in an earlier period, this is due not to abstraction but to the stabilizing of metaphorical and metonymical extensions.

For example, it has been noted that many words related to probability, like the word chance, are connected with falling. Such a response presumably first arose in a situation in which a prominent feature was the fall of something - say a coin. An associated feature was the apparent lack of determination of the result. The coin might come heads or tails. This feature,

while less conspicuous, was actually more important to the gambler, and the word concerned with falling would therefore become attached to it. Later it could be emitted when the same sort of unpredictability appeared upon an occasion when nothing was falling. The chance that the coin would come heads becomes the chance that it will rain tomorrow. When the response is now reinforced in this new situation, the connection with falling may be lost, as is the case with the form chance in English today. And in the hands of the mathematicians the controlling situations are still further varied, so that the abstraction becomes more and more tenuous. The final stimulus property could acquire control of a verbal response only through some such historical process, in which slight tendencies in individual behavior accumulate.

But the property might well have been effective in other ways. In certain complex situations in which a given event may or may not occur according to various schedules, rats and pigeons will behave precisely as if they were calculating probabilities. The fact that there is no clear indication of whether a coin will come heads or tails or of whether the sun will shine tomorrow will affect behavior whether the response chance has been conditioned or not. When the response has been acquired we are able to deal with chance in a different way. It is the difference between being sensitive to red as a property of stimuli and possessing the abstract property red. There clearly is such a difference, and it is an important one. As we shall see later, the verbal response has a special relevance to the problem of knowledge.

How far can the process of abstraction go? In the case of inferior organisms we can answer this question meaningfully. We can investigate the sensory and discriminative capacities and perhaps discover boundaries beyond which it would be impossible to establish effective stimulus classes. But the question is unanswerable in the case of human behavior. Abstraction has already proceeded as far as all properties which can be mentioned, and we cannot mention any property which has not yet been put in control of any abstract tact.

It is nevertheless possible to discuss special areas of difficulty and perhaps to designate lines beyond which we cannot go. For example, how are we to deal with stimuli which arise within the organism and are therefore private to a particular speaker? The difficulty here is that a verbal community cannot reinforce behavior with respect to stimuli to which it cannot respond. As I have shown elsewhere, all responses to private stimuli show either metaphorical or metonymical extension, they are very likely to become impure tacts, and the process of abstraction cannot be carried out with respect to the property of privacy itself. These facts have extraordinary significance in interpreting subjective terms.

The abstract tact has many advantages. The process of abstraction strengthens the control by a specific class of stimuli and makes the verbal response more precise and effective. The listener is not likely to be surprised or misled by the response which results from these strict contingencies. A second special achievement is that the abstract tact is adaptable to, and effective in, novel situations. When a series of responses

has been set up to single properties or clusters of properties, a new situation will result in the emission of many responses. A more or less effective response is made to a situation which has never arisen before in the history of the speaker. The coat with the blue buttons in the hall closet is in a sense the name of an object. It might have had a proper name: the Sunday coat. But the proper name would have had to be conditioned with respect to this particular object; whereas the composed name could be emitted when the coat was seen for the first time. When responses are set up to single properties rather than to total stimulus presentations, practically any number of combinations of stimuli can be represented with a limited repertoire.

We must not expect the composed name to be any more exact as a representation of the thing than the underlying process will allow. Many people are disturbed by the lack of a complete correspondence between nature and our descriptions of nature. The listener undoubtedly reacts to a speaker's behavior in a less comprehensive way than to the non-verbal situation. The difference will be in part the limitation of the language and in part the limitation of the speaker. Two speakers will emit very different complex responses to a common situation, not because there is anything unaccounted for in the controlling relations, but because the histories of reinforcement differ. The scientist will make one type of response because of the special reinforcement of the scientific verbal community. The poet will emit other responses because they are effective for other reasons - either upon himself or upon the non-scientific reinforcing environment. Which comes closer to the real thing is not so much a question of fact or truth as of what the appropriate community is going to do with the response. For many purposes it may behave quite as effectively to the verbal response as to the original stimulus.

Since our subject matter is verbal behavior and not other treatments of verbal behavior, we have no reason to make sure that we have accounted for any relation of reference or any function of symbolization. The basic relation between a verbal response and a non-verbal stimulus which we call a tact has an unambiguous status as a scientific fact. It might be thought of as a semantic unit, but it is also a grammatical and to some extent a syntactical unit as well, since it embraces the intention of the speaker. What remains of the standard material of grammar and syntax will be examined later. The tact provides for the evaluation of something very much like truth value in terms of the standard contingency of reinforcement and the effectiveness of a response in a standard verbal community.

But it is a causal unit and hence very different from a logical unit of reference. Its only place is in accounting for the appearance of certain forms of response at certain times. The logical structure usually adopts the notion of a correspondence between words and things with this case in mind but continues to use the relation for classificatory purposes with other material. As we have seen, many intraverbal relations are treated as if they were tacts. In other words, relations which obtain between words and words are treated as if they were relations between words and things - in order to preserve the basic notion. This would lead into many a hoary problem of definition, of the difference between analytic and synthetic sentences, and so on. We can avoid these problems by steadfastly refusing to be drawn

into a logical analysis. The data of a science of verbal behavior are clear, and we are safe so long as we do not read into our terms anything which is appropriate to a different sort of analysis.

The types of verbal behavior which have been discussed - the mand, the echoic response, the textual response, the intraverbal response, the relation to an audience, and the tact - are offered as exhaustive. These are the kinds of variables of which verbal behavior is a function. But our analysis is not complete because verbal behavior is not simply the unorganized emission of verbal responses one after the other. Our variables might be said to generate the materials from which verbal behavior is composed, but the act of composition is another matter. Before we may consider the processes which forge this material into the larger samples of verbal behavior with which we are familiar, we must examine one other fact about our variables. They do not act one at a time. Verbal behavior is usually the product of multiple causation. Some of the curious consequences will be discussed next week.

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CHAPTER FIVE: Multiple Sources of Verbal Strength

Several basic types of verbal behavior have been distinguished in terms of the variables of which the behavior is a function. The types have a certain resemblance to the established categories of logic and linguistics, which are to some extent concerned with a similar classification. One who is primarily interested in logical or linguistic analyses may feel that a relation between a verbal response and the controlling environment is a rather feeble substitute for the traditional notion of reference. The possibilities of the relation have certainly not been so thoroughly investigated as the comparable logical and lexical structures. But any present weakness of that sort is more than balanced by very great advantages elsewhere in the verbal field.

The material to be discussed in the present lecture is a case in point. We are concerned here with some of the most important data in the field of verbal behavior, data which dominate the field of literature which are useful in interpreting the way in which the listener or reader may be said to understand verbal behavior, which are indispensable in wit and other forms of verbal play, and which probably play a more practical role in creative thinking than has yet been recognized. The traditional formulation of verbal behavior has forced these highly significant data back into some preverbal region of the mind, where scores of faculties and thought processes have had to be invented to explain them. In a direct scientific account the data are to be expected and simple, and they can be represented - and within the limits of rigor which now characterize the field, they can be explained - without the help of any new principle.

Two significant facts emerge from our study of the basic functional relations. A single variable usually controls more than one response. This is true of the audience by definition. It is true of the intraverbal relation because of the great number and range of the connections established between verbal stimuli and verbal responses in the normal environment. A single drive may control a group of responses receiving appropriate reinforcement and may extend its power still further in the case of the magical mand. In the relation called a tact, a single stimulus will control all the responses related to its separate properties as abstract tacts and many other responses in metaphorical and metonymical extension. We have not yet mentioned the synonymous forms developed by different verbal environments.

In the second place a single response may be, and usually is, a function of more than one variable. A single form of response usually appears in every one of our principal verbal types. The result of these two facts is that verbal behavior is frequently a function of many variables operating at once. Any response which is made because of a relation to one variable has a fair chance of being related to another variable also present. It is a well established principle in non-verbal behavior that separate sources of strength are additive, and this principle is sufficient to account for a wide variety of verbal effects. Since many variables reduce the strength of verbal behavior in a fashion to be discussed next week, the addition must be algebraic.

We have little reason to examine the case in which mul-

tiple control arises from a single set of reinforcing circumstances. The audience-variable, for example, naturally acts in concert with other variables and has little effect by itself. In the impure tact the stimulus control, possibly deficient, is combined with a special interest by a single reinforcement or by a set of similar reinforcements. But multiple variation becomes interesting when relations which have been separately established are combined for the first time. The growing verbal strength of the soapbox orator as his audience increases is perhaps a trivial instance of an additive effect, but the appearance of a negative audience - say, a policeman when the behavior is seditious - will decrease the strength, perhaps to a value below the threshold. Whispering is a form and energy level of response which results when a nearby audience is positively and a more distant one negatively reinforcing. A common mand for attention of the nearby audience is Psst! Two different audiences have in general a weakening effect because the only behavior which is strong is common to both, and this may be slight. For example, verbal behavior in the presence of an audience composed of technical and non-technical listeners may be weaker than in the presence of either alone.

A secret language is a class of responses emitted in the presence of two audiences but effective upon only one of them, as when parents speak French to exclude children from a conversation. Underworld cant serves as a secret language in this way. The thief in eighteenth century London could say to his confederate Stow it, the cove's awake, and thereby warn him that an intended victim was on the alert, without being understood by passersby. The doctor writes a prescription which can be understood by the pharmacist but not the patient, and in a famous story by O. Henry a telegram was composed in American slang so that it could not be deciphered by the South American police who intercepted it, even with the help of an English dictionary. Slang changes so fast that a dictionary of some sort is almost needed to make the translation today: His nibs skedaddled yesterday per jack-rabbit line with all the coin in the kitty and the bundle of muslin he's spoony about.

In all cases of this sort we may suppose that there are various alternative (synonymous) responses in the repertoire of the speaker, and that the negative audience reduces the strength of all forms except the one emitted. In irony a single response is selected from a group of synonymous responses appropriate to one audience because it has a different effect on a second audience. A distinguished scholar frequently acknowledged a complimentary copy of a book by writing to the author I shall lose no time in reading the book you have sent me. With respect to one audience this was synonymous with I am going to read it as soon as possible. With respect to another audience, of which the scholar himself was a member, it was synonymous with I can't waste my time on such stuff. The common member of the two thematic groups was emitted. When Socrates encouraged a newcomer to talk, the response had different effects upon the newcomers and the rest of the group. The dramatist puts into the mouth of a character a remark which has one supposed effect upon the other characters on the stage and another effect upon the spectators. The special effect of irony requires that one of the audiences makes both responses.

Satire and allegory are forms of verbal behavior in which responses are emitted

with respect to one audience because they are effective upon another. Gulliver's Travels has different effects upon the young and the socially sophisticated reader. The effect may be similar to a secret language - the social criticism is in effect concealed beneath the innocent tale - but an analysis in terms of a repertoire common to two audiences is possible. As in the case of irony, the sophisticated audience must respond in both ways or the satire or allegory would be lost.

Talking to a second person through a third is another example of a compound audience. A great deal of verbal behavior is unreinforced or perhaps negatively reinforced by persons of real or ceremonial importance. One may act upon such a person verbally by speaking to a third person in his hearing. For example, one may complain of injustice in the presence of, but not speaking directly to, a magistrate.

The principle of multiple causation begins to yield interesting results when our other variables are involved - the mand, the tact, the intraverbal response, and echoic and textual behavior. We must consider two sorts of material. In the case of data collected from casual discourse, literature, history, and so on, we usually only infer the relevant variables. The inference is sometimes sound enough, but the analysis is merely an interpretation. But we also make use of multiple causation in controlling verbal behavior inside and outside the laboratory and here the demonstration of multiple relations is on better scientific ground. I shall consider the interpretative material first. It can be divided naturally into three classes. In the first class a single standard form is strengthened through at least two controlling relations of independent origin.

A legend in a magazine beneath a picture of the Prime Minister's kitchen stated A bad meal cooked here can derange British history. Whatever variable was primarily responsible for this remark strengthened a group of responses which included derange, change, disturb, deflect, and alter. A prominent kitchen range in the center of the picture suggests an additional source for the form derange, which was otherwise not the most probable or the happiest selection. An advertisement showing a few bars of music began with the caption Noteworthy Music, where the response noteworthy seems to have been selected from a group which might have contained exceptional, distinctive, unusual and outstanding. In both of these cases the supplementary variable was a non-verbal stimulus - the picture of the range and the musical notes. In general, the evidence in a quoted passage is best when the relation is intraverbal. A newspaper reporting upon a convention of dentists asserted that dental legislation was keeping pace and that laws with teeth in them were being enacted. A writer discussing the death of a famous woman aviator said The round-the-world flight was to have been her last grave undertaking. The last two words as a synonym for serious enterprise have additional intraverbal connections with death. Grave seems particularly forced by the relation. A young man in complaining about the food served in a college dining hall insisted that the students organize a diet to consider the matter. The unusualness of the form diet is convincing evidence of an additional and obvious source of strength. Perhaps the Diet of Worms was not entirely irrelevant. A similar interpretation

may be made of responses like:

One night, with the ship loaded with dynamite, a terrific storm blew up.

This, the borers-from-within feel, augurs well for them.

The new rules for lateral passes will provide a greater latitude for the development of new plays.

The selection of latitude may be attributed either to self-echoism or the variable originally responsible for the response lateral, or both. In some instances, self-echoism seems ruled out. A student who told me I know a store where you can get discs at a discount immediately noted that disc was an unusual form. The effect of discount is obvious, but this occurred second. Presumably both instances are due to the same variable.

The supplementary variable is sometimes evident in the separate appearance of an appropriate form. A newspaper confession read in part as follows:

Her brother had been over to China and he shot one of the giant pandas, and he tried to get me a job in that museum. It didn't pan out, and so...

We can interpret this as a self-echoic strengthening of it didn't pan out in a group of synonyms which included it didn't work, he failed, and so on, or as merely a residual effect of the variable responsible for the emission of panda, or both.

It is difficult to prove this principle in more subtle cases, but it is reasonable to suppose that it works to an extent which is beyond our present methods of measurement. It appears to be at work in a discussion of the special effectiveness of propaganda in an impoverished country which contained the sentence If you're hungry enough you can swallow anything, or in the comment of a cross-country hiker Those no-trespassing signs are very forbidding, and even in the expression Most theories of language run aground at this point, in the sense that the literal use of at this point may have received an increment of strength from the fact that it is easy to run aground near a point of land.

It is not essential that the speaker be "aware of" the second connection. In most of these cases the response would have been withheld if this were so, according to a principle to be discussed next week, and any experienced writer knows how often such instances are cut out of a text. But the best known examples of multiple strength are puns, and here the double connection is evident to all. An excellent example, which will be familiar to many of you, is attributed to Dean Briggs. The commencement exercises of a small college were being held on a particularly hot June day. Dean Briggs was to speak, but he found, when he had been introduced and as he started to rise, that the varnish on his chair, softened by the heat, had taken a firm hold on his coattails. There was a moment of general embarrassment and laughter as Dean and chair were separated. Dean Briggs then stepped forward and began I had intended to bring to you today an unvarnished tale ... If I may be permitted to spoil the story, we may imagine that the controlling variables operated in something like the following way: The current stimulus responsible for varnished tail was obvious enough. An unvarnished tale may be regarded as a member of a large group of responses appropriate

to public speaking and hence in some strength at the moment. The complete remark represents more than the combined strength of the emitted response, for the material had to be made into a sentence. A less witty person with the same combined strength might have been unable to make a plausible sentence of it.

According to the modern taste a pun is good if both variables are relevant. Otherwise it is aptly called far-fetched. In the lugubrious pun from Cymbeline:

Golden lads and girls all must,
As chimney sweepers, come to dust

Come to dust has obviously strengthened chimney sweepers, for which there is no other relevant variable, instead of the other way around as a good pun requires.[†] But when Dr. Johnson offered to make a pun on any subject, and when someone proposed the King said The King is not a subject, satisfied all the requirements.[†] But this is anticipating a later discussion of the effect upon the listener.

Literature is, as we should expect, especially rich in the thematic interconnections for which multiple causation is responsible. When T. S. Eliot writes

What will the spider do.
Suspend his operations?

suspend is multiply determined - by the variable which might have prompted the alternative cease or desist in, and an intraverbal variable associated with the characteristic suspensory activities of spiders. In the same poem the line

The tiger springs in the new year

shows multiple sources of the response springs. The alternative leaps would lack the intraverbal connection with new year. An early discussion of this sort of multiple meaning appears in The Poetic Mind of Prescott. Professor Richard has, as have Riding and Graves, dealt with it extensively. Empson's Seven Types of Ambiguity are mainly concerned with it, and his book contains some of the most ingenious and exhaustive paraphrases ever made in an attempt to reveal multiple sources of verbal strength.

The principle can be carried much farther than the analysis of a brief passage. A whole poem or prose passage may often be taken apart and reassembled in a few thematic groups. Many of Shakespeare's sonnets can be reduced to a surprisingly small number of such groups. The principal variables responsible for the poem can thus be detected, and as we shall see later, considerable light is thereby thrown on the process through which this latent material might have been converted into a literary work. Some of this grouping could arise from intraverbal processes without multiple strengthening. For example a trivial thematic group concerned with posture is distributed through the sentence "Blessed is the man that walketh not in the way of sinners, nor sitteth in the seat of the scornful."^{*} But the final sitteth in the seat is even then multiply determined. The main variables could as easily have led to associate with, has anything to do with, is found in the presence of, and so on.

^{*}Full quotation elided above: Blessed is the man that walketh not in the counsel of the ungodly, nor standeth in the way of sinners, nor sitteth in the seat of the scornful.

But walketh and standeth comprise a powerful compound intraverbal stimulus which makes the selection of any synonym containing sitteth especially likely. And similarly, when a figure of speech is labored at great length, the process may seem to be nothing more than intraverbal. But if some predetermined subject matter continues to control the behavior even in a modified form, the result represents multiple causation.

When we describe a piece of bad luck as the slings and arrows of outrageous fortune our behavior is multiply determined - by the circumstances so described and by the resting intraverbal strength acquired from textual or echoic behavior with respect to the play. This principle has been developed into a philosophy of literature, often associated with the name of Ezra Pound, and subscribed to by many modern critics. Literature builds upon the literary past, and it does this by picking up phrases, names, perhaps merely cadences or stress patterns from established literary works. As A. C. Pearson says, in Greek tragedy both dialogue and lyrics are permitted with literary associations controlling the choice of words. If the textual or intraverbal responses are not straight quotations but have some current strength in the behavior of the writer, the sources are obviously multiple. Except for the prestige of the writers upon whom modern literature chooses to build, there is little difference between this principle and the "influences" and "borrowings" of earlier criticism. To take a standard example, when Shakespeare writes the prophetic spirit of the wide world dreaming on things to come, Wordsworth picks it up as Prophetic spirit that inspires the human soul of universal earth dreaming on things to come. Wordsworth was building upon his literary past, whether he knew it or not. His behavior was clearly multiply determined. The response is distorted but this, as we shall see in a moment, is the commoner effect in multiple causation.

We must not allow these literary examples to obscure the basic formulation. Traditional criticism has generally not been concerned with reducing the literary process to simple terms. On the contrary it usually contains a mixture of impure tacts arising from emotional and honorific preoccupations. But literary behavior is in no sense above or beyond the reach of a science of verbal behavior. Indeed, as we have seen, it is oftener a clearer record of the action of our basic variables than scientific behavior, because the whole range of variables is exploited, so we describe all the preceding examples with the single principle of an algebraic addition of verbal strength.

Whether the speaker or writer is aware of a relation will be important in the making of sentences. It is essentially a question of whether the relation itself enters in as a variable in the control of other behavior. We permit multiply determined behavior to be emitted in some cases; in other cases we withhold it. But in no case can we alter the multiple control. We cannot speak at all without showing traces of earlier relations, even though a strong variable may seem to be in control at the moment. When there is only a weak momentary control, the power of the collateral variables is proportionally great. We cannot, of course, pick verbal examples out of the blue. It does not come out of the blue but out of our latent verbal reserves, as the Freudians are so fond of noting. We cannot emit a random

series of numbers, for strong intraverbal sequences will be effective if we attempt to withhold what seem to be clear instances; we suppress some sequences which would have arisen "from chance." For the same reason we cannot emit pure nonsense. Even the finest work of Gertrude Stein shows neat little thematic groups - trivially related, it is true, but none the less powerful.

Negative values of strength enter algebraically in many ways. A euphemism is a member of a thematic group selected not because of special strength but because of the weakening effect of another variable upon other members of the group. In an extreme case the strength of a response may be so low that we call it forgotten. The actual process involved in the effect of negative reinforcement is too complex to be discussed here.

The preceding account has considered cases in which a single and complete response could be related to at least two independently established sources of strength. We may now turn to a class of examples in which only a part of a response can be related to a supplementary variable. The rest of the response is determined by the primary variable, and does not show multiple causation. The case brings up again the problem of the unit of functional relation. In echoic and textual behavior, as we have seen, the functional units may be no larger than phonemes, and some are smaller. We can demonstrate a fractional multiple control in either case. If we say Give me a word beginning with t, this mand for verbal action strengthens only part of the response made in reply. The rest of the reply must come from elsewhere - from some resting latent strength or some feature of the environment. Our listener may simply look about him and say Table. Similarly we can get him to emit rhyming words or words having a given stress pattern, and so on. In each case some variable aside from our request controls the major part of the response but we have controlled a small fraction. Is this possible in the case of the tact or intraverbal response?

If so, it would mean that in the presence of a book or, better, a whole library, we should have to suppose that we are likely to emit, not only the form book but any response beginning with b, any monosyllable, any monosyllable with the sound oo, any word rhyming with ook, and so on. These tendencies might not be great. Together they would simply add up to the tendency to say book. Hence they would be difficult to detect, and any reliable proof would be difficult for other reasons. If the response book were emitted, even subvocally, we should have to attribute any fragmentary response to echoism - as an already demonstrated case. But if book were not emitted we should have little evidence that the book was controlling the behavior at all.

Nevertheless responses which are of low strength - say, a poorly conditioned response or a badly remembered one - sometimes occur in fragments. A five-year-old girl upon being served noodles for the second time called them Yankee doodles. The separate strength of the fragment oodles is evident. Even if the response Yankee doodle is assumed to be very strong, it could have had no connection with the present situation except through the previously poorly conditioned noodles. Similarly, in the recall of names it has often been pointed out that single sounds or frac-

tional groups of sounds emerge separately. A name may be recalled as "beginning with T" or as "rhyming with Hale," and so on. In so-called "rhyming argot" names are given to people or things by combining a fragment of the normal name with an intraverbal response. The Mrs. is displaced by Cheese and kisses, hair by bonny fair, and so on.

There are other evidences of the ultimate "atomic" unit of the tact and the intraverbal response. Echoism can apparently be ruled out in examples like disc and discount, in which the multiply determined form occurs first, unless it is argued that a subvocal response had previously been made. And when the form of response is highly exceptional or distorted, a demonstration may be possible in the absence of the separate appearance of the whole response. But the matter clearly needs further study. The only statistically reliable case at the present time is that in which the additional variables lead to the separate emission of the whole form. The net result is that a fragmentary formal element appears twice or oftener in a single passage. Whether this is due to echoic behavior or not, it is at least reliable evidence of multiple causation.

In an example like Peter Piper picked a peck of pickled peppers we do not need a statistical proof of the likelihood that what Piper originally picked may have been a bushel of dried turnips. The exceptional pressure on the form peck, pickled or peppers is readily accepted. In strict rhyme schemes also the second rhyming form is scarcely due to chance. But this is not true of alliteration or assonance in English verse, because the formal element has no prescribed position and is therefore less easy to predict or evaluate. Critics generally accept as evidence of alliteration adjacent occurrences of sounds which may easily have arisen from chance. Even a line like Borne on the bier with white and bristling beard with its four bs might occur without multiple causation of any of the b-forms. In a study of the first one hundred of Shakespeare's sonnets, I calculated the expected frequencies of lines containing four, three, and two occurrences of the same initial consonants in stressed syllables. The results may be briefly summarized in this way: Not oftener than once in 350 lines did Shakespeare emit a response - or, as we may say with respect to a person of such eminence, choose a synonym - because it added a fourth instance of an initial consonant which had already appeared three times in the line. Only once in 350 lines did he select a synonym which would add a third instance to a pair already in the line. And about once in every 450 lines, he discarded a word because it contained an initial consonant already in the line. This is very slim evidence for anything like a process of fragmentary multiple causation. The sonnets remain, of course, exactly as alliterative as they have always been - if we refer merely to the sound pattern which they exhibit. But the proof of an alliterative process - of a fragmentary strengthening - is quite inadequate.

In a poet like Swinburne, who could write

The faint fresh flame of the young year flushes
From leaf to flower and flower to fruit

we expect another result and get it. Here the alliteration is not only evident, it can be traced as a function of the distance

between the first and second occurrences of the sound. If we examine each pair of adjacent syllables, we find fifty-five percent excess of similar pairs over the frequencies expected from chance. In syllables separated by one intervening syllable, the excess is 32 percent, and when three syllables intervene, 20 percent. All these figures are statistically significant in demonstrating a fragmentary strengthening of one response in each pair.

When we demonstrate that certain parts of a literary work show the fragmentary addition of verbal strengths, we do not, of course, account for the whole literary process. In the case of a strict rhyme scheme, for example, the poet does not emit the right form at the right time from sheer luck. The actual composition of a passage involves other processes, which will be discussed next week, including a process by virtue of which fragmentary strengthening is encouraged. But in interpreting these additional behavioral processes we shall not need to disturb the present conclusion that a fragmentary strengthening is at work.

Further evidence of multiple variation is supplied by a third class of instances, in which the resulting response shows formal distortion which must be due, and is often very obviously due to the combined action of separate sources of strength. We need no proof of the overpowering fragmentary contribution to a type of rhyming response commonly associated with Ogden Nash:

If called by a panther
Don't anther.

The response answer intraverbally strengthened by call is overpowered by the echoic fragment from panther. And this occurs often enough in everyday discourse. An ex-president of the Anti-Saloon League stated in a newsreel interview;

Our old slogan was, The saloon must go. Our new saloogan is ...

The result is almost inevitable if one must talk about saloons and slogans at the same time. A young girl spending the summer in the country explained to a new friend that she had a prettier doll which she had left in the cittier. The same child also once referred to her pocket-booket.

There is a variety of distorted pun which involves this principle. The following example depends upon an intraverbal borrowing from the poem by Keats which ends

Or like stout Cortez when with eagle eyes
He gazed at the Pacific and all his men
Looked at one another with a wild surmise
Silent upon a peak in Darien.

I was once describing to a young but eminent logician an episode in a walk along a section of the Maine coast. I had emerged from some woods to find myself standing upon a large boulder with the surf striking the rocky coast directly below me. "There I stood," I said, "looking out over the sea, silent on a peak in Darien. Suddenly I felt the boulder move . . ." The young logician immediately exclaimed, "Imagine your wild surprise!" The remark, like that of Dean Briggs, establishes very narrow time limits within which the verbal process must have worked itself out. It was a matter of one or two seconds at the most. But the process was simple. The separate strengths of wild

surmise and Imagine your surprise! are obvious.

An adequate classification of the kinds of distortions produced by multiple causation is too extensive to be reviewed in detail here. The intonation of one response may fuse with the phonetic pattern of another as when a child cries and talks at the same time to produce whining. It may involve forms appropriate to different verbal systems, as when a mathematician's handwriting contains letters which look like figures or a musician's letters which look like staves and notes. Onomatopoeic intonation represents the vocal parallel. When an executive gestures "thumbs down" on a proposition and at the same time presses a button to have his visitor thrown out, a similar fusion occurs.

One type of distortion occurs due to trivial multiple sources. In an error of anticipation, for example, the variable would have produced a single effective response if the combined strength had not first produced the error. Examples of this have been extensively reported and discussed. The white rat in a maze comes out as the white raze, slightly fatter comes out slatter, and so on. Attempts to deal with these as motor disorders miss the point and have to be abandoned as soon as we reach slightly more complicated material. The additional strength may be a separate significant source. The young boy who reported that Eskimos killed whales and ate the slobber does not require comment. Many errors of reading, hearing and recall are of this sort.

Some distortions involve only a small fragmentary contribution from the second variable. Others are more equally divided. In haplological fusion, two responses are joined by the omission of one instance of a repeated element as in twinfants or cinemactor - a verbal device now very fashionable among journalists. The most intimate type of fusion was described by Lewis Carroll in this way: "Take the two words 'fuming' and 'furious.' Make up your mind that you will say both words, but leave it unsettled which you say first. Now open your mouth and speak. If your thoughts incline ever so little towards 'fuming,' you will say 'fuming-furious'; if they turn even by a hair's breadth towards 'furious', you will say 'furious-fuming'; but if you have the rarest of gifts, a perfectly balanced mind, you will say 'frumious'."

If the distorted form is itself standard in the language, the "resting strength" of the response may make a third contribution. Thus heritage more readily occurs as a fusion of sacrilege and heresy because it is a standard form in its own right. The possibility of arriving at a third standard form is often important because the result may be taken as significant with respect to another source of strength. The young lady who, being taken to dinner by a young man for the first time, looked over the menu and exclaimed I am simply ravished! may have been the innocent victim of a fusion of ravenous and famished. This would be sufficient to account for the result without supposing any special strength of ravish.

The responses which suffer distortion may be larger than single words. Do you matter if as a fusion of Do you mind

and Does it matter; in the nick of his teeth as a fusion of in the nick of time and by the skin of his teeth; there's no crime against it as a fusion of It's no crime and there's no law against it - these are examples of a familiar sort of phrase-blend. A single strong response may displace another response completely, as in the well-known story of Mr. Morgan's nose, in which a woman entertaining the elder Mr. Morgan at tea was embarrassed by the fact that her young daughter was conspicuously fascinated by Mr. Morgan's prominent nose and lapsed into asking her guest, "Will you have cream on your nose?" This is scarcely multiple causation, except that the whole response is distorted by a combination of variables. But the intruding response may itself be strong because of several sources of strength. A woman was asked to speak at a dinner which had been arranged to advocate the repeal of the prohibition amendment. She had had very little experience in public speaking and grew increasingly nervous as the time to speak approached. Just as she rose, someone placed a microphone in front of her. This was the last straw. Her first words, which she herself was astonished to hear, were This is the first time I have ever faced a speakeasy. The two principal contributors toward this intrusion were, of course, the microphone itself, which is a sort of device for speaking easily, and the general subject of the evening's discussion - the repeal of the prohibition amendment. But there may have been other sources. Speak and speech were certainly strong, and This isn't going to be easy was perhaps part of her previous subvocal behavior.

The evidence for the simultaneous operation of more than one variable, and for the kinds of effects which result, is reasonably satisfactory even with respect to material in which we can only infer some of the relevant variables. We are used to overlooking the effects of the process because they interfere with the normal practical consequences of verbal behavior, but the evidence which one can accumulate over a period of years is embarrassingly prodigious. The preceding summary has been very sketchy, indeed. But it is necessary to save time to consider the more convincing evidence which arises when we undertake to control the emission of verbal behavior by deliberately manipulating additional sources of strength.

There are many reasons why we may be interested in evoking verbal behavior which already exists in some strength. It may be important to us that someone recall a name or a fact, or speak up at an appropriate moment, or get something off his chest, or find out what is bothering him, and so on. We cannot simply mand the required verbal behavior. We may not know what it is, and it may not be effective if it is due entirely to our contribution. In all the cases which follow, the behavior which is finally evoked has had some strength apart from our contribution, and this original strength has played an effective part in the determination of the response. Why the behavior is not strong enough to be emitted without supplementation is not relevant to the process. The original determining variables may be weak. The drive may be low, the stimulus vague; the response may be poorly conditioned or partially forgotten; it may be repressed or suffering interference from other behavior. The problem of supplementation is the same in all these cases.

The supplementary evocation of verbal behavior is an engineering task which naturally directs us to the functional analysis we have already made. Our variables are useful, not only in interpreting or predicting verbal behavior, but in controlling it whenever the necessary manipulation of the variables can be achieved. The engineering use of the variables depends upon the basic unit repertoire. If we use an appropriate stimulus for an echoic or textual supplementary response, we act upon various formal elements of the response. We may call this formal supplementation. Stimuli appropriate to tacts and intraverbal responses will not act upon formal elements in an identifiable way. We may call it thematic supplementation and our technological problem is difficult. In each case we may succeed merely in making subvocal behavior vocal, but in the more important case the behavior could not be emitted in any form until supplemented.

Another distinction must be made. If we know in advance what behavior we are to evoke, our variables can be fairly specific. Supplementation of this sort we may call prompting. On the other hand, if we know merely that there is behavior in strength which it is important to uncover, but not what the behavior is, our choice of variables must be less specific. The engineering task will be different. This kind of supplementation we may call probing. We have to examine, then, the four cases of the formal prompt, the formal probe, the thematic prompt, and the thematic probe.

The formal prompt is exemplified by the theatrical case, in which a deficient intraverbal response on the part of an actor is supplemented with a partial echoic stimulus supplied by the prompter. If the actor does not know the line at all, if there is no original intraverbal strength, the effect is not prompting but full-fledged echoic behavior. Formal prompting is common in education - in teaching a child a beginning verbal repertoire, as well as in setting up later complex intraverbal sequences which are called knowledge. Education begins with a full echoic case, passes through the stage of formal prompting, and ends when the educator can discontinue all contributions toward the response.

The formal material used is often a few initial phonetic units. The prompt for Istanbul might be Is. But a rhyming prompt is also effective, and a mere stress pattern may be enough. Many verbal games use formal prompts. Crossword puzzles begin with a set of intraverbal stimuli - the definitions. As the puzzle is filled out, formal prompts of increasing size develop. These supplement the intraverbal relations and eventually evoke the completed puzzle.

The radio quiz program demonstrates the technique of prompting in its most objectionable form. Because certain public relations must be maintained, the master of ceremonies must get a given verbal response from the participating member of the audience at any cost. The thematic prompt is to be preferred if it will at all work, but the formal prompt is often necessary. If the required response is, say, Washington, then the master of ceremonies may begin with Wa then pass to Wash and Washing and finally Washingto... If it proves necessary to

go so far as Washington, with the final n, it is usually assumed that the contestant did not know the answer. The prompt has become a full-fledged echoic stimulus, and the contestant is given credit only for possessing an echoic repertoire.

A disguised formal prompt is an echoic or textual stimulus concealed within a larger verbal response. If we are trying to evoke the response addition, a disguised prompt would be Would you like a bit of advice? The concealed ad is much less effective than the overt prompt Add ... Facts of this sort are often used to argue that a sense of belongingness is important if our functional relations are to be effective but the difference is that the deliberate prompt is not only a formal determiner of response but essentially a mand for echoic behavior. It has a motivating effect upon the listener as well as a determining effect upon the form of response. This can be introduced into the disguised prompt by archly emphasizing the ad - Would you like a bit of ADvice?

Formal prompts may be accidental. I once forgot to turn off an electric soldering iron which I had been using in a basement workshop. Thirty-four hours later I read the word solder, immediately jumped up, went to the basement, and turned the iron off. Here a latent response of inadequate but nevertheless considerable strength had persisted for many hours. The textual response to the printed word was a necessary supplement in "remembering the iron."

We prompt ourselves deliberately by memorizing mnemonic poems in order to recall more complex material. Having learned On old Olympus' piney top[†] we can better recall the cranial nerves in their correct order. The actual procedure involves the intraverbal recall of the mnemonic poem, which then supplies a formal prompt for the name of each nerve. When we recall a name by looking at a list on which the name appears, we pick up the necessary increment from a textual response. We cannot do this unless the response already has some strength. Conversely, when we are trying to find a name on a list, we may repeat the name to ourselves - Jones, Jones, Jones - as we run down the page. In this way we use self-echoic sources to supplement the textual response,[†] which we expect to be weak as the result of our very hasty inspection of the page. Abbreviated notes are a variety of self-prompt, but in reading a lecture, as in the present case, the behavior is probably wholly textual and hence not multiply determined. Taking a running start after forgetting part of a poem is a thematic technique, but beating out a stress pattern, when this is known, is formal self-prompting.

In the formal probe the supplementary material is also echoic or textual but the behavior is not known in advance. We may still have good reason to evoke it. The clinician wants to know what drives or interests are dominant in the behavior of his client, and this can be discovered by discovering what verbal behavior is strong. Many of the commonest ways of finding out classify as thematic probes, but the formal probe is also useful and many have advantages. For example, we may want to know what types of behavior are dominant, whether a person is full of mands or tacts or is predisposed toward echoic behavior, and so on. We may also want to avoid the determination of groups of responses

which is inevitable in the thematic probes.

The engineering technique appropriate to this problem has been recognized for a long time. Dick Whittington supplied an example when he heard the bells say Turn again Whittington, Lord Mayor of London. It has been used extensively in literature. In the Old Wives' Tale of Arnold Bennett a young girl running away from home hears the beating of the train over the rails say Why are you here? Why are you here? Why are you here? And a character of Tolstoi's, listening to a friend as they lean over the rail of a ferry boat, hears the lapping water say, It's the truth. It's the truth. It's the truth.

In all cases of this sort an auditory stimulus leads to a verbal response through a sort of subphonemic echoism. The formal similarity is actually slight and the stimulus must be repeated many times in order to build up a sufficient supplementary strength. Separate small contributions must be summated, according to an established principle in non-verbal behavior. The main determiner of the form of response is therefore in the speaker. The behavior which is emitted already has some special level of strength. Whittington was ambitious, the runaway was regretting her action, and Pierre was being convinced against his will. Only on the assumption of this latent strength can we explain the fact that the response was emitted, for the auditory stimulus bore as close a resemblance to hundreds of other standard responses in the listener's repertoire.

The technical device which uses the process in the laboratory and clinic is called the verbal summator. It is a phonograph which repeats a vague pattern of speech sounds at low intensity or against a noisy background as often as may be needed to get a response. Sample patterns are i u u oo a, o a u e, and e u i uu. At low intensities these sound like natural speech heard through a wall. It is possible, and desirable, to conceal from the subject the fact that the sound patterns are nonsense. Under satisfactory conditions a subject will hear the phonograph say something for each pattern. Most subjects require no more than ten or fifteen presentations in each case. Hundreds of responses can be collected in a few hours, while the subject remains unaware of the sources of his behavior. Since it is impossible to conduct such an experiment in vacuo, there will be some external determination of the verbal behavior which follows. The subject emits responses which are under the control of features of the environment. The relation is, of course, not seen by him. For example, after watching the experimenter adjust two small knobs on the apparatus, one subject heard the phonograph say what wheels do you touch? When the needle was sharpened with a Red-top Sharpener, one subject heard the phonograph say He bought a top and another A needle for the top. A distant clock striking the half hour led to Half-past, and so on. Another common type of response is the mand, particularly with respect to drives which arise from the exigencies of the experiment itself. It is difficult to listen to faint sounds for any length of time, and this strengthens responses like Call them louder, Make it close, Force them harder, and Look out, you're going to sleep.

Not more than three or four percent of the responses obtained with the verbal summator can plausibly be traced to

external determiners. But as soon as a few responses have been emitted, many self-echoic and intraverbal connections take over. The response Hire a bootblack is followed immediately by Have a bluebook, when a considerable formal strengthening is supplemented by the intraverbal connection between black and blue. Pairs of responses commonly rhyme as in Blow that fuse up, No shoes up; Trial by another, Is he your brother?; and Over golden seas, There are men at ease.

The presence of multiple variables with weak external determination is an optimal condition for verbal play. Feeble puns sometimes occur, as in the pair of responses Harry Goldman and in a gold mine or the repeated interchange of the forms higher and hire in a long series of responses. One subject gave three or four years ago followed by an historical article. The incongruous juxtaposition of three or four years and historical may explain a response slightly historical which appeared much later in the experiment. This appears to be a distorted form of a commoner expression slightly hysterical.

Whether the verbal material fished up out of one's latent reserves in such an experiment has any great significance in interpreting a personality or a personal problem need not be answered in connection with the present point. It is a problem which is common to the interpretation of literary works, personal documents, and other recorded verbal behavior. The relevant point at the moment is simply that such an experiment works. Verbal behavior can be evoked - almost at will - with a formal probe. The additional evidence that successive verbal responses are complexly interrelated, even in behavior which has not been organized by the speaker into a coherent sample, is a welcome bonus.

There are other kinds of formal probing. A repeated rhythmic pattern will evoke verbal responses, but as we might expect from the greater importance of rhythmic stress in musical speech, they tend to be snatches of songs. Ritualistic chants and incantation have a similar effect. A visual form of the verbal summator has been developed by W. K. Estes. Patterns of letters are exposed for a very short time or as if they were badly out of focus, and the subject makes what he thinks is a textual response. He sees the visual material, just as the subject hears the auditory material, as words - as recorded verbal behavior. The types of response and their interconnections are very similar to those in the auditory experiment. We also use a formal probe, but with a somewhat more limited scope, when we ask someone to make a list of words beginning with a given letter, or having a certain length, or rhyming with a given word, or having any other fragmentary specification.

When it is not possible to disguise the source of the behavior, the subject will edit his responses, perhaps below the verbal threshold. Those which are emitted will be fewer and not so illuminating. Why the formal probe is more effective when the source is disguised will be discussed next week. To put it roughly, the speaker does not need to accept the responsibility for what he is saying when he believes his behavior to be echoic. So long as we can maintain a sort of non-pathological hallucination, the latent repertoire is easily reached. This is difficult when we attempt to probe our own verbal behavior. The use of incantations, rituals, dances, and so on, to generate signs, omens, and

other revelatory verbal behavior is, in general, limited to the unsophisticated.

We turn now to the supplementary evocation of verbal behavior which does not use the small unit repertoires of echoic and textual behavior. The first case, the thematic prompt, is better known as a "hint." A verbal response is strengthened by introducing a variable which controls it as a tact or as an intraverbal response. Thus, we may get another cup of tea by inspecting our empty cup or by conspicuously draining the last drop. Will you have some tea? must be assumed to be in some strength. The hint must not be so broad as to generate the required behavior entirely on its own.

We could get a comparable result with a disguised formal prompt - by mentioning a reported shortage of tea, for example. But in the thematic case it is a non-verbal stimulus which sets the occasion for the response desired.

A thematic prompt is more often intraverbal. When, as we say, we "bring a conversation around to a given subject," we generally do so by introducing stimuli which have strong intraverbal connections. We could strengthen the response tea by emitting responses like coffee, Cambric, cup, orange-peko, and so on. Naturally, we should use suitable disguise. It is assumed, of course, that a more direct device, such as Offer me some tea, is not available. Occasions which follow these specifications are common. If we have agreed with B that he is to speak to C about a given matter and if B forgets, we cannot repeat our request in C's hearing but must instead resort to one or the other type of prompt. In the thematic case we emit responses which will strengthen the forgotten responses in B through an intraverbal relation.

The quiz program is again useful in demonstrating the process in its crudest form. The master of ceremonies will usually resort first to the thematic prompt, because it is less obvious than the formal and seems to give more credit to the participating member of the audience. To get the answer Washington, he may put on a three-cornered hat and chop at an imaginary cherry tree. A verbal form of thematic prompt would be The father of his country which may be either emitted in such a way as to mand the echoic response essential to the summation of strength or disguised in a response which lacks the motivating character or the mand.

Many verbal games use thematic prompts. The crossword puzzle, as we have seen, combines formal and thematic sources. One of the earliest verbal games, the riddle or conundrum, consists of strengthening a response - the "answer" - by diverse and often thematically remote intraverbal stimuli. The game called "Twenty Questions" is a riddle in which the victim must create his own thematic prompts by asking questions to be answered by the other players with Yes or No.

The thematic prompt can be used upon one's own verbal behavior. We recall a word by repeating synonyms or near synonyms, hoping for the intraverbal relation to supply the needed extra strength. We recall a name by responding to relevant non-verbal material; What is his name? I met him at So-and-so's; he is studying mycology. We repeat the line of verse which precedes a forgotten line in order to summate feeble intraverbal tendencies. We solve verbal problems by going over relevant material and rearranging

it so that better intraverbal relations may be strengthened.

The final case - the thematic probe - is illustrated by a wide variety of clinical practices, particularly the projective techniques. The clinician is under the necessity of getting his client to talk, but he frequently does not know in advance what the client will say or what part of what he says will be important. He must therefore use a probe rather than a prompt. He may use a prompt to get some sort of verbal behavior under way: Tell me about yourself. But he expects this either to be forgotten as intraverbal relations take over in more or less free association or to remain important merely in delimiting a general area of discourse. But it is impossible to evoke behavior which is thematically completely free by using a thematic probe. Some measure of prompting remains. This has been, indeed, the subject of many discussions of clinical practice.

The thematic probe is used not so much to generate verbal behavior related to specific variables as to conceal the controlling relations from the speaker. The client is unfortunately generally aware that he is talking. He cannot, as in the verbal summator, shift the responsibility for what he says to someone else. He will therefore edit behavior which is controlled by certain variables, in a manner to be discussed next week. This means that strong behavior may be emitted subvocally or in the more important case may not even reach the subvocal level. For this reason the clinician places great emphasis upon behavior which he alone is able to relate to probable controlling variables - slips, allusions, significant proximities of response, possible metaphorical strengthening as in Freudian "symbols" and so on. The thematic probes generate behavior superficially controlled by one variable but related in a more important fashion to other variables in which the clinician is especially interested.

The basic formulation of verbal behavior under multiple control still applies. In the thematic apperception tests stimuli of various sorts are presented - pictures, music, odors, colors, and so on. The subject is motivated to emit verbal behavior with respect to them. A literal description composed of all these available abstract tacts would be quite disappointing, because there would be little or no contribution from underlying sources of strength. It is necessary to encourage metaphorical and intraverbal behavior to minimize the immediate thematic control. Since literature, as we have seen, is a verbal practice which encourages behavior of subtle strength, the client may simply be asked to "write a story" about a given presentation.

The Rorschach ink-blot test is a picture test which reduces the immediate control by reducing the picture. The ink-blot test is a verbal summator which exploits fragmentary tact relationships - or, with due regard to seniority, the verbal summator is an auditory ink-blot test.

The thematic apperception tests and the Rorschach test use non-verbal stimuli of one sort or another. The verbal counterpart of the thematic probe is the word-association test. Here again the stimulus control is minimized, and particular associations are interpreted in relation to additional variables in the behavior of the speaker. Any plausible relation which the

subject himself does not react to is viewed as especially important.

Regardless of the use to which it may be put, the thematic probe generates a large amount of verbal behavior in one way or another. The experimental contribution is thematic according to our present definition, and the result, no matter what its significance, is an example of multiple causation.

A simple way to demonstrate the effectiveness of multiple causation in verbal behavior is to accept the engineering task of evoking a given response in a given speaker at a given time. The devices to be used will depend upon the response specified, upon the speaker's history, and so on. But in a selected case our procedure demonstrates our faith in the combined action of multiple variables. For example, suppose we are to evoke the response pencil in a naïve subject. (If the subject is not naïve, he is already under the influence of variables affecting the result and we should have to stop to deal with these variables first.) Proceeding step by step in retracing our analysis, we first create a strong drive. For example, we make sure that no pencil is available, then hand the subject a pad of paper appropriate to pencil drawing, and offer him a hundred dollars if he can draw a recognizable picture of a cat. The mand pencil will certainly acquire strength. Secondly, we set up a stimulus for the tact pencil by putting a very large or unusual pencil in an unusual place - say half submerged in a large aquarium, within sight of our subject. We strengthen the response intraverbally by having a phonograph repeat pen and --, pen and --, pen and --, or by posting large signs reading PEN AND *** on the walls. We get the echoic response pencil with a phonograph saying pencil, pencil, alternating with the first phonograph, and we could get the textual response pencil with signs saying PENCIL, interspersed among the other signs. Lastly, we supply the audience of several obviously English speaking people whose pockets are bulging with pencils with which they will presumably reinforce the mand pencil. If under these circumstances, our subject does not say pencil, does not in fact fairly scream it, we shall be inclined to agree with the logician after all that pencil is simply a word used as a sign for a thing called a pencil and that to call it a verbal response is an impertinence.

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CHAPTER SIX: Making Sentences

Verbal behavior has so far been treated as a series of separate responses existing at any time in given states of strength under the control of relevant variables in the environment and history of the speaker. It may seem as if the speaker himself has been left entirely out of account. We have made no use of the fact that there is someone who knows what he is saying or what he wants to say and how to say it. Is the speaker merely an interested bystander? This is certainly the direction in which any analysis of behavior moves. The speaker is a limited version of the old notion of a controlling "self." It is a convincing self because the form of response is sharply defined. Evidently, there is more than the behavior of speaking; there is someone speaking.

But the speaker as a causal agent is naturally at war with the causal relations identified in the course of a scientific analysis. Whenever we demonstrate that an independent variable has a functional control, we reduce the supposed contribution of any inner agent. Thus, if the occurrence of a response is due to the action of a stimulus or a condition which changes a drive, then it is not necessary to say that the speaker uses the response to describe the stimulus or disclose the drive. If an intraverbal association follows frequencies of contiguous usage, we need not say that the speaker is exercising any faculty of subordination, supraordination, or coadjunction. If a metaphorical extension takes place because a common stimulus property has acquired control, then the speaker is not using the figure to express a perceived similarity. If an audience strengthens a particular sub-language according to the principle of multiple variation, then the speaker is not choosing words which are appropriate to his audience. Even if we view these statements as interchangeable translations, in which all terms are defined by reference to behavior, the preeminence of the speaker is lost in the first statement in each pair.

But we have not yet got rid of the speaker entirely. We have not, in the first place, accounted for all verbal responses, and those which remain - responses like if, that, as, therefore, and some - strongly suggest an inner contribution. These terms are a perennial source of trouble in working out semantic correspondences, and we have not yet demonstrated any special advantage with respect to them. They are commonly attributed to the speaker's intention, to his propositional attitudes, and so on. Must we bring him into our account, too?

We have also repeatedly disclaimed any attempt to account for assertion with the notion of a functional relation. A chair may cause the response chair, but the response does not assert the existence of the chair. The verbal response takes account of the speaker's motivation and it is a vast improvement over the "word chair" for that reason. But mere emission no matter how dynamic will not serve as a substitute for assertion and will not account for responses like is or the final -s on many verbs which are especially concerned with assertion. Are these responses also the contribution of the speaker himself?

Thirdly, we have not yet accounted for the order to be observed in large samples of verbal behavior, as well as for other evidence of what we might call "deliberate composition." The order in which our unit response will occur will be due in part to relative strength,

to intraverbal linkages, and to certain orders in the environment and history of the speaker. But the larger design which is evident in most verbal behavior cannot be explained in this way. The verbal response which we have so far considered might be regarded as the raw material out of which verbal behavior is manufactured. But who is the manufacturer?

The concept of a controlling self, of which the speaker is a special case, is not necessarily to be avoided because of its dubious physical status or its kinship with discredited concepts in science and philosophy. It might be possible to put it in good order with a careful operational definition. The concept is objectionable because it does not explain anything. It has been used throughout recorded history to throw the problem of the determination of behavior back into an inaccessible realm where it can be forgotten. No ultimate explanation is achieved. For what, in turn, explains the behavior of the inner self? If we assume that the speaker is responsible for any of the characteristics of verbal behavior, how are we to account for the activities which bring this about? The speaker is merely the locus of verbal behavior. Any conception of him as an originator of action, or of any feature of action, must be scrupulously avoided. It does not matter whether the self is supposed to be merely part of the organism or all of it, or whether it is given a physiological or mental status. It is still not a cause. And if we define it in behavioral terms alone, it is simply useless. Nothing worse can be said of a scientific concept.

The problem of order and design, of deliberate composition, of assertion, and of relation must be attacked with the instruments of analysis already in our possession. Instead of accepting a traditional formulation, which we then try to translate, we must look at the actual data and see what can be done about them. Undoubtedly we are dealing with a difficulty of the first magnitude. No traditional treatment has ever satisfied anyone for long. But let us continue with a program which has been fruitful up to this point. What is the actual behavior to be accounted for, and where are the variables to which we can turn for a scientific description?

When we examine the problem in this light, we discover that we are dealing with a complex behavioral relation which has a counterpart in the non-verbal field. It is possible for behavior to become in turn one of the independent variables of which other behavior is a function. In any given example we have two responding systems, one based upon the other. The second level of behavior cannot be accounted for without taking the first level into account. This condition has led to more than one knotty problem. It is the key to the problem of self-knowledge or awareness and of self-control. In the verbal field the logicians have already recognized the necessity for talking about two levels, although they deal with only a relatively simple case of a very extensive principle.

It is not surprising that the notion of a self arises when behavior is compounded in this way, because one system of responses seems to be guiding or altering the other very much as an inner agent is supposed to do. But if we can analyze the behavior at the secondary level by reducing it to the same kinds of relations which prevail at the primary level, no additional process and no different kind of controlling force need be brought in. When we

show that the previous behavior of the speaker is the variable which controls other responses which have the form of tact, we put "knowing what one is saying" on the same level as "knowing" anything in the stimulating environment. And if we can show that primary behavior in the course of emission leads to secondary responses which alter the behavior of the listener with respect to the primary behavior, we can account for assertion, negation, quantification, and many of the other supposed activities of the speaker. Deliberation, planning, and the encouragement of propagation of one's own verbal behavior submit to similar analyses.

The simplest case of secondary verbal behavior is that in which a verbal response, having already been emitted, is then reacted to by the speaker precisely like any other objective part of the environment - as an auditory event if the primary behavior is vocal, as a visual event if it is written. If we take "being able to respond to something verbally" as an important case of "knowing," then this is the case in which we can be said to "know what we have said." Our response to a previous response of the same form is either echoic or textual. We might expect it to be a tact, but we may recall that the only functional difference is in the unit repertoire. In quoting a response, whether our own or another speaker's, we use the atomic units of echoic and textual behavior. We add other responses, however. We respond to the speaker as I or he or John and to the activity of speaking with, for example, said. The complete response I said "Heads" is controlled in turn by a speaker (I), a verbal activity (said) and an echoic stimulus (the previous response Heads).

We may also respond verbally to the variables of which such behavior is a function. In short, verbal behavior with respect to previous verbal behavior, whether our own or another speaker's, is as extensive as a science of verbal behavior itself.

We engage in such secondary behavior, aside from any interest in a science of verbal behavior, because it is important to the verbal community and well reinforced. It answers questions like What did you say? and Why did you say that? and the answers are as important to the community as the primary behavior itself. One of the curious consequences of this fact is that we develop a sense of awareness because it is important to someone else. For social reasons, our behavior becomes important to ourselves.

We use secondary verbal behavior of this sort in collecting data for a scientific analysis, particularly where primary behavior occurs under circumstances which make direct observation difficult or impossible. The case of covert or incipient verbal behavior has attracted special attention. I said to myself or I was going to say may be followed by a response which an investigator has no independent way of observing. This is also true of the future case: I'm going to tell him a thing or two. Presumably these are all verbal responses under the control of previous verbal responses in the speaker's behavior. The previous responses have been emitted subvocally and then audibly echoed, together with a statement of the conditions under which they were, or are about to be, emitted. The speaker can respond in this way because he has a more direct connection with his subvocal behavior than the experimenter can ever hope to establish. But the scientific use of reports of this sort is limited by the deficiencies of verbal behavior with respect to private stimuli. Such responses are acquired only through metaphorical or metonymical extension, and they cannot be

pinned down by a restricted reinforcement. They are subject to impure distortions of the tact relation and are notoriously unreliable. When a student is told the answer to a question and says I was going to say that, there is room for doubt, and we can never be sure. A similar technical problem is faced whenever we attempt to deal with long subvocal chains of intraverbal behavior.

Much of our primary verbal behavior never evokes secondary responses. As Russell says, "When you see a black object and say 'this is black,' you are not, as a rule, noticing that you say these words; you know the thing is black, but you do not know that you say it is." We could translate by saying that many primary tacts do not evoke secondary tacts. But in a more interesting case the speaker cannot respond to what he has said. As usual the "cannot" needs to be interpreted. The fact is that the speaker does not react to his own behavior at the moment of emission - for motivational or other reasons. Later, when a reason is supplied - for example, when someone says what did you say? - the required conditions may be lacking. If the behavior was written and the record has survived, it is always possible to see that one has said something, even though one cannot now react to the behavior of writing it down. The effects of vocal behavior are quickly lost, and no tact may be possible. Whether this is a matter of no significant original stimulation, or forgetting, or a more active kind of weakening, is not relevant here.

One example of behavior which leads to no secondary response is the mistake which passes without notice. Even the concerted testimony of others present may not convince a man that he said Lee and not Lincoln. It is a curious fact that when the intruding response is repeated, it may lead to a response to the first instance and a correction. In the North you had a leader of humble origin like Lee; in the South a man like Lee - I mean, in the North you had a man of humble origin like Lincoln... It would seem to follow that the appearance of a slip, whether corrected or not, shows that it was not reacted to in advance of emission.

Unnoticed verbal behavior is common in the case of written behavior, but perhaps more often corrected in that form. In preparing a mimeographed examination I drew a series of small circles and labeled each one with the name of a person of some importance in the history of psychology. I instructed the student to draw a line from circle to circle to indicate the historical continuity. The title of the question was Who followed Whom? About an hour later I reflected that since one of the names was Hume, I could enliven the examination if I made the title read Who followed Hume? When I returned to the manuscript, I found I had already written Hume.

In the well known phenomenon called automatic writing, the speaker's reaction to his own behavior is apparently completely lacking. The commonest case involves written behavior, but automatic talking is also possible. The written case is easiest to collect, and it may also facilitate the phenomenon because by looking away from the paper one may reduce self-stimulation to a fairly vague proprioception, whereas in the vocal case a more familiar stimulation is inevitable. The special characteristics of automatic writing seem to be related to the lack of oneself as audience.

Even though the form of one's own behavior may be tacted,

the controlling variable may not be identified as such. The variables may simply be overlooked or misinterpreted or escape detection, as in I can't understand what made me say that. In the verbal summator experiment, as we saw last week, the speaker can repeat his behavior but he cannot necessarily say that it is his own behavior. He classified it as echoic, although he may actually be commenting upon some feature of the environment. We all overlook relations which guide our verbal behavior to some extent. A response may work its way unnoticed into our conversation because of a conspicuous stimulus which is otherwise unnoticed. It may seem inconsistent to say that a stimulus may be a stimulus and one's own response [to it may not].[†] The former may affect the strength of a response while the latter remains ineffective. In a similar way we cannot always retrace the intraverbal steps which lead to the solution of a problem. "One forms half the conclusions of one's life," as Trollope says, "without any distinct knowledge that the premises have even passed through one's mind." And we may make a metaphorical extension of a response without knowing what property of the stimulus has taken control. When we say He reminds me of so-and-so but I don't know why, we are saying essentially He leads me to say "so-and-so" but I can't identify the controlling feature of his appearance.

It is even commoner to fail to identify emotional circumstances which determine speech. Trollope, who was fascinated by the problem, supplies another good example in the Last Chronicles of Barset. Trollope heard two men complain that they were tired of one of his best characters, the domineering wife of Bishop Proudie, and so he killed her off half-way through the book he was then writing. Perhaps he also killed her off out of sympathy for the hen-pecked Bishop. At any rate, the Bishop needed a little time to realize what life would mean without his ubiquitous wife. The routine of his household was changed, and definitely for the better. He could have his mail bag left for him now where he pleased either on the breakfast table or in his study, and untouched until he should go to it. "Blessed be the name of the Lord," he said as he thought of all this; but, says Trollope, "he did not stop to analyse what he was saying."

In behavior which is multiply controlled, at least one variable commonly goes unidentified. Literary or personal borrowings are often unseen and unacknowledged, and much wit is as much a surprise to the speaker as to the listener. I can give a not-very-witty example from my own experience. I was writing a paper in which I referred especially to some experiment on the behavior of anthropoid apes. I was complaining of the unorganized and often opportunistic ways in which the problems of a science of behavior were commonly attacked. Instead of an organized campaign, I wrote, such investigators seem content with a sort of guerilla warfare. Several weeks later a colleague raised the question of whether what he took to be my little joke was appropriate in a scientific paper. In all innocence of any wit, I had spelled it gorilla.

There is nothing particularly surprising about the fact that we can respond to our own behavior in this way or that we sometimes do. Our primary behavior becomes part of the world of things and events and is then fair game for later verbal behavior. The form of our secondary behavior will remain essentially the same, where the primary behavior is produced by ourselves or someone else. But there is another kind of response which depends upon collateral verbal behavior. It is easily confused with the preceding but requires a different interpretation. In the response I say he's right, the form he's right looks like a quotation. The response seems to be the present midpoint between the past I said "He's right" and the future I am going to say He's right. But here is a great difference in effect when the response is in the present. This is recognized by the fact that no part of such a response is written in quotation marks. The response does not talk about verbal behavior; it is merely an intensified form of the behavior itself. There is only one instance of the form he's right. It is not an echoic response. There is no chaining. It is not a response to another response which has already become part of the world of things and events. In fact, in the usual case the temporal order is reversed.

The effect upon the listener is also very different. Such a response is an answer to the colloquial What do you say? This is a mand for a response, not a report of a response. It is quite different from What did you say? and requires a different interpretation. It is the first step toward analysis of the problems with which this lecture is concerned. It will be convenient to have a name for it. Secondary behavior which stands in the relation to primary behavior which is not to be investigated will be called autoclitic. The term is intended to suggest behavior which "leans upon itself." The examples to be discussed first, including I say, may be called descriptive autoclitics.

Some descriptive autoclitics are controlled by the type of the verbal response which they accompany. Thus I tell you, I'm telling you, I declare, and I observe indicate that the response which follows is a tact. I demand, I ask you, and I wish indicate subsequent mands. I repeat identifies the following response as a self-echoic, and I hear (as in I hear he has gone out of town) as echoic of the behavior of someone else. I see (by the papers) or the less elegant I read where identify the response as primarily textual but perhaps now intraverbal. I am reminded indicates a simple intraverbal response. I say is non-committal as to type but is generally confined to tacts, mands and intraverbal responses, in which the form originates with the present speaker. The British I say is idiomatic but preserves traces of similar function.

Other descriptive autoclitics are controlled by the strength or weakness of the accompanying response. The source of the strength or weakness may or may not be made clear. Thus, I guess that's Harry shows an inadequate control probably due to a deficient stimulus. The response might be made to a poor visual stimulus (someone at a distance) or the ambiguous sound of footsteps, and so on. I suppose, I doubt, I believe, I hesitate to say, and I surmise precede responses which are weak for similar reasons. A curious case, which deserves more attention than we can give it here, is I think. The response which follows is apparently always weak. The converse of I think is I know. I think he is here and I know he is here arise under very different conditions of the stimuli in control of the response He is here. The difference responsible for the autoclitic is in the strength of the response. I insist, I'm sure, and I assure you are other indicators of strong responses.

More complex relations between verbal behavior and the controlling conditions are indicated by I admit, I deny, I reply, I submit, and I promise. Responses like I'm happy to say or I regret to inform you carry the topic beyond our present reach, since the number of different circumstances which can serve for similar responses is unlimited. There are also elliptical variations in which the speaker does not appear to react to his own behavior. Thus, They say may take the place of I hear in indicating an echoic response. Responses beginning with One (as in One might say) are less sharply controlled, as in also the perennial It is interesting to note. You may very well reply is a version of I would reply. A surprisingly objective response is It occurs to me. It occurs to me that Oscar might be able to help you can be translated The response "Oscar might be able to help you" occurs to me.[†]

Another kind of descriptive autoclitic does not seem to be controlled by a speaker or by any activity of speaking. But the

similarity of function can be shown by making rough translations into more obviously autoclitic terms. Thus, Undoubtedly, he will agree has the effect of I'm sure he will agree. Perhaps I will go is the equivalent of I am inclined to say I will go. Undoubtedly and perhaps, like probably, quite, maybe, indeed, of course, and many others, are responses to the strength of the accompanying verbal behavior.

The effect upon the listener is generally obvious. When the autoclitic indicates the type of accompanying response, a much more accurate inference can be made of the circumstances under which the speaker's behavior depends upon an indication of its strength. I'm sure leads the listener to react optimally to the response to follow. I think leads to a qualified response. These effects in turn account for the presence of the response in the speaker's behavior. Responses which are so described are optimally effective, and they receive, therefore, a special sort of generalized reinforcement. The exact behavior of the listener will be determined by the accompanying response. The generalized reinforcement for the autoclitic itself is merely the greater effectiveness and the absence of confusing or otherwise negatively reinforcing results. Descriptive autoclitics, therefore, are, as the name implies and as the forms indicate, a species of tact. Their special status is due to the effect which they have in clarifying and qualifying the listener's behavior.

It is this special effect which distinguishes them from simple secondary behavior in which responses are made to prior verbal behavior as part of the world of things and events. The listener reacts to I hesitated to say that he is wrong as a modified version of his reaction to He is wrong, and the reinforcement of the autoclitic is merely the greater effectiveness of the total response. The concurrency of response and autoclitic makes the difference. As we have seen, the autoclitic is not a chained response, in which prior verbal behavior has been converted into a stimulus. There is no echoic behavior - no quotation - but rather a single qualified emission. As a consequence there is no problem of covert or incipient behavior, as in simple secondary verbal behavior. If the accompanying response is not overt, no autoclitic is emitted. The incomplete and dubious I think... may raise the question of what response was so described, but the response itself is not a datum to be considered. If the overt response is emitted without an autoclitic, there is no problem.

A single example, however, shows how necessary it sometimes is to split a hair. The response It is true that I exaggerate contains an autoclitic - It is true - which heightens the effect of the rest of the response. It indicates that the response is emitted in spite of certain variables which tend to suppress it. A fairly close descriptive autoclitic is I admit. But true is a fighting word. The logicians are at great pains to tell us how and when it can be used. Since it refers to verbal behavior it cannot be in the primary or object language, as Tarski has shown. In Carnap's term it is in the metalanguage. But the metalanguage is not essentially autoclitic though, like any language, it contains autoclitics. It is simply behavior in response to prior verbal behavior, which has now become part of the world of things and events. It does not matter whether the primary behavior is emitted by the speaker or by someone else. No matter what problem a secondary language in this sense raises for the logician, there is no problem in a science of verbal behavior. The temporal order of events is such that responses to verbal events have the status of simple tacts. One such tact is true, where the controlling

situation involves a correspondence of some sort between a prior verbal response and a controlling state of affairs. But to say that a given instance of I exaggerate was true is very different from saying It is true that I exaggerate. The latter response appears under a more restricted set of conditions. Its effect upon the listener is associated with the effect of the accompanying response I exaggerate at the time of emission.

Fortunately, the corresponding metalanguage equivalents of other descriptive autoclitics are not so troublesome. I admit that I exaggerate becomes "I exaggerate" is an admission. I hesitate to say he is a liar becomes "He is a liar" is said with hesitation. And so on. Since no one is professionally interested in admissions or in hesitation, as the logician is interested in truth, these descriptive autoclitics stand unchallenged.

A hierarchy of languages appears to have been introduced by the logicians in order to solve certain paradoxes - for example the heterological paradox. We can deal with the paradoxes in a similar way in a causal account. And the solution does not involve autoclitic behavior. In dealing with verbal responses, rather than words, we are not likely to be misled by a statement that a word can describe itself. Obviously, no response can be made to itself as a stimulus, but only to past instances of similar form. But modern logic has extended the notion of a secondary language to territory which is covered by the autoclitic as here defined, and this work is helpful in a causal analysis for the simple reason that it is a causal analysis.

The response No provides a good example. Together with the related forms not, never, and nothing, and affixes like the privatives a- or -less,[†] it has been discussed at length by philosophers and logicians. The problem is to find the referent for the negative term. In a logical analysis we may perhaps say that the referent of It is not raining is the absence of rain, but this is clearly an impossible solution in a causal science of verbal behavior. If the absence of rain evokes this response, why do we not emit a tremendous battery of responses under the control of the absences of thousands of other things? The traditional solution, which seems to apply here, is that there must be some reason for saying It IS raining. Russell thinks that the reason is always verbal. Someone asks, Is it raining? and we answer, No, it is not raining. But this is too narrow a view. The stimulus which controls the response to which no or not is added is often non-verbal. It may be merely a similar stimulus - a few drops from a lawn-sprinkler beyond a hedge, for example. The response It is raining is then a species of metaphor, though of no literary value. The metaphorical nature is suggested by the fact that a common alternative to It is not raining involves the metaphorical tag like: It looks (or feels or sounds or smells) like rain. Other examples of responses to which no or not is added are intraverbal; some irrelevant contiguity of usage has strengthened a response which is now inappropriate. In each case, there is a partial control of a response, the response is emitted, but the lack of the contingent property leads to the additional no or not.

The effect of no is most clearly seen when it is emitted as a mand for the cessation of some non-verbal activity. We observe that someone is about to perform a dangerous act and cry NO! A singer misses a high note by a full half-tone and we cry

No! also. We say No! to children to prevent various undesirable acts - for example, the handling of a fragile object of art. By a sort of magical extension of the mand we also emit the response when it is too late and the object has been shattered. The response is naturally extended to verbal acts. A child says Two and two are five, and we say No. This does not stop the present instance, just as it does not save the object of art, but it may prevent a repetition and permit a correct response. We do the same thing with respect to our own behavior. We may reach for a cigarette, or a piece of candy, say No! and stop. The parallel verbal case is exemplified by the response: It was during the Administration of President Hoover - No, Coolidge! where the No serves, as it were, to stop or cancel the response Hoover and clear the way for Coolidge.

We acquire this response from the verbal community. The child first hears No when it establishes an occasion upon which some activity must be stopped, if positive reinforcement is to be received or negative reinforcement avoided. The child comes to emit the response upon similar occasions according to principles which have already been discussed. It is an example of a response acquired through echoic stimulation. The child may then reach for an object but say No. The response may not at this stage have any functional effect upon the behavior of the listener or the child itself. It is merely appropriate to the situation - like the response Going up, which one tends to say in entering an elevator simply because it has been heard there many times. The verbal parallel is obvious. The child emits the verbal response red, say, under inadequate circumstances and hears, No, that's not red. And this response is then acquired under the control of similar circumstances. It is not merely the absence of a red stimulus which is the controlling condition. The response no is made when the response red is emitted or likely to be emitted to stimuli which are orange, purple, or some other color. It is the combined stimulus of the prior response and the situation which is the occasion for the response no.

Sooner or later such a response acquired functional significance because it is followed by a specific result. In the absence of No, a response emitted under deficient circumstances will have conflicting and otherwise undesirable results in the behavior of the listener. By adding no or not these results are prevented. The response No becomes a mand - which may be roughly translated Don't take this response seriously, or Don't react to it at all. It also has the effect upon the speaker himself when he blocks an unprofitable intraverbal chain or clears the ground for the correction of a solecism. In general, then, a qualifying autoclitic is a mand which alters the behavior of the hearer with respect to accompanying verbal behavior. The distinction which can be drawn between a simple secondary response to prior verbal behavior and the qualifying autoclitic is therefore clearer than in the case of the descriptive autoclitic.

The passage of the response from its "absolute" use in bringing verbal or non-verbal behavior to a stop to a syntactical position in a large sample of behavior is accomplished with processes which we have already considered. With respect to a single individual, we note (1) the initial occurrence of the response in a reinforcing community, (2) its acquisition by the individual as a response appropriate to a given type of situation, (3) its functional development as a mand as an increased effectiveness begins to follow, and (4) the final appearance of the response in controlling the behavior of the in-

dividual himself, both verbal and non-verbal. That it is the same response throughout is especially clear when the response does not have a standard linguistic form. A girl two years and two months old learned to shake her head instead of saying No. As many children do, she would approach a forbidden object, reach, stop, and shake her head. This was transferred to verbal behavior exactly as No is transferred. A verbal response - say, This is mine - would be emitted under inappropriate circumstances and accompanied by a shake of the head. It was the equivalent of This is not mine.

When a descriptive and a qualifying autoclitic are combined, the consequences are often rather subtle. It is true that he is not a liar will arise under rather different circumstances from those controlling It is not true that he is a liar. I do not say that he is a liar is a third possibility, and what is called paraleipsis is still a fourth: I do not refer to his having lied. These complicated matters may be straightened out by analyzing the order of events which lead to the final composition, but we have little reason to pause here for such analysis. Similarly, we can make short shrift of whether He is not ill is the same as "He is ill" is false, or as He is well. In general, solutions follow the lines of modern logical analysis.

The interpretation of no is less strained in a causal analysis than in a logical because it is not necessary to assume that a discrete autoclitic response is made in every instance. This is particularly true for the affixes which have a similar function - the privative initial a- or un- or the suffix -less. A sunless sky is simply a kind of sky and the response sunless may be as simply determined as cloudy. Someone must since have been inclined to say sun and added the -less as qualifying autoclitic, but the verbal environment comes to reinforce the response when it is evoked by an objective stimulus. What controls the response is not the absence of the sun but the presence of clouds. He is ill and He is unwell are comparable descriptions. If Not bad, not bad differs from Good, good! it is because some tendency to say bad survives in the first case, but this may not be common. Similarly I'm not surprised may be under the control of a readily identified unitary condition of the speaker. Many instances which are not due to separate reinforcement as standard responses are intraverbal sequences. Genuine negation is perhaps as rare as genuine metaphorical or metonymical extension.

Just as No! may stop the listener, so Yes! encourages him to continue. As No! cancels the statement mandated by a question, so Yes! affirms it. But unfortunately Yes does not transfer to a syntactical position as No does, and in English its representatives in that position are hard to interpret because they serve as many as three or four other functions at the same time. The response is is the clearest case. Its kinship with Yes is apparent in the common coupling, Yes, it is. That it is similar to the autoclitics already discussed is shown by comparing I think it's Joe and It IS Joe. One response suggests weakness, the other strength, but a common autoclitic function is clear.

But is and the other responses which serve as autoclitics of assertion in English are controlled by other conditions. Is, for example, is related to certain temporal characteristics of the stimulus. We can separate the two functions. The assertive func-

tion is common to is and was but the temporal control differs. If someone says It was raining and we reply It IS raining, our response is equivalent to It is raining now where the strong IS, like the form now, is controlled by the temporal condition. If someone says It isn't raining, the same reply, It IS raining, is the equivalent of the colloquial It is SO raining where the strong IS like so, is controlled by the conditions responsible for the assertive autoclitic. So is similar to certainly (Certainly it's raining!), of course (Of course it's raining!), and other descriptive autoclitics already mentioned. Although the response is is a function of more than one variable, the relevant causal relation here is to the condition of adequacy of certain controlling variables. So far as this function is concerned, the response acts upon the listener to strengthen the reaction to the accompanying response. The autoclitic enjoins the listener to accept a given state of affairs, and must therefore, like No, be classified as a special sort of mand. The fact that a denial or any other condition likely to weaken the listener's response immediately intensifies the assertive autoclitic is evidence of its mand character. Children, less constrained by grammar, use is in its pure assertive form in the antiphonal contraction (A): Is (B): Isn't (A): Is (B): Isn't ... This may be clear-cut, powerful behavior even when what is asserted and denied has been forgotten.

Among the other functions which assertive autoclitics serve is another autoclitic function - predication. The simple assertive autoclitic must be bolstered with It or There, as in It is an ancient mariner or There is a man for you. But where It is dark merely guarantees the stimulus for dark, The room is dark guarantees the superposition of stimuli for room and dark. If we say The chief end of logic is to dispute well the is does not enjoin the listener to accept either the chief end of logic or to dispute well as a response emitted under reliable circumstances. It enjoins him to equate them in his own verbal behavior. Marlowe emphasizes the autoclitic function by writing it

Is, to dispute well, Logick's chieftest end

This is, of course, intraverbal behavior. But when we respond to a complex situation by saying the book is red, the is also testifies, not to the adequacy of the stimulus for book or red, but to their conjoint appearance in the same object. Other autoclitics act upon the listener by indicating the kind or degree of tact extension. When we respond to a novel stimulus with a response which respects the contingent property, we indicate the extension with an appropriate autoclitic. We say It's a kind of chair or A sort of brown. The appropriateness of the responses kind and sort to a generic extension is often overlooked. The colloquial forms It's kind of hard or sort of heavy indicate extension mainly along a continuum of intensity or magnitude. When the extension is metaphorical we say as or like or the suffix -like or -ly. He is like a lion leads the listener to avoid any unnecessary precautions. Bright as the sun qualifies the emission of sun. A ghostlike apparition advises the listener that the apparition isn't actually a ghost.

Another set of autoclitics have been the subject of extended discussion among logicians. They are commonly called qualifiers.[†] In a scientific account of verbal behavior we cannot suppose that anyone ever responds to all swans. If he says All swans are white, he means at least all the swans in his experience, but even so he is not responding to them all on this occasion unless his experience with

swans is extremely limited. The all is an autoclitic which may be translated Sometimes it is possible to say. By also paraphrasing is as an autoclitic of predication and assertion we may translate a syllogism in this way: When it is possible to say "Swan," it is always possible to say "White;" when it is possible to say "Bird," it is sometimes possible to say "White." Another response commonly encountered in the syllogism is no. This is combined with a temporal fragment to get never, which is "cognate" with Always and Sometimes. The syllogism, as a device which leads to a third statement, given the first two, is an intraverbal practice established by the verbal community because it yields effective new verbal responses. Any discussion of syllogism has the status of statements about the relations among autoclitics in useful combination.

In any given instance, outside the field of logical analysis, the responses All, Some, and No have autoclitic effects in altering the behavior of the listener. If I say Some logicians will object to this interpretation, the response may be translated The response "Logicians will object" is not made by me with respect to every logician, but you should be prepared to be affected by it from time to time. For the listener some is a stimulus which characteristically accompanies responses made in a situation in which an appropriate response is only periodically reinforced. It results in a characteristic intermediate and relative stable state of strength. In this case the appropriate response to the listener assumed an intermediate state of strength of the appropriate response to an objecting logician.

Two other inflammatory examples of quantifying autoclitics are the articles a and the, but we have no time to discuss them here.

The Diversions of Purley, an extraordinary book by John Horne Tooke, a linguistic scholar of the late eighteenth century,[†] is the best introduction to the autoclitics which remain. Tooke's theory of abbreviation anticipated the modern distinction between descriptive and logical terms. It classified all words as either nouns and verbs or abbreviations. The abbreviations were words like and, but, that, if, to or for. Tooke "dis-abbreviated" them by making longer paraphrases. He justified his paraphrases by reference to etymology, in which he was perhaps oftener right in spirit than in fact. But as he himself pointed out, the etymology was not an essential part of the argument. He seems to have missed the full significance of a language which talks about language. He regarded his abbreviations as being used solely for the sake of dispatch - as a matter of speed and efficiency - and thought that they could always be reduced to the other type of words. Their special function in altering the behavior of the listener was made perfectly clear by his ingenious expansions, but it was not an explicit part of his theory. The special terms which he analyzed are what we should here call mands upon the listener which alter the listener's behavior with respect to the rest of each utterance.

Thus the conjunction and is simply an injunction to add something to what has already been said. But, which goes back to be-out, is an injunction to exclude something from what has just been said: All but Henry left the room. This is easier to interpret if you substitute the less abbreviated form except for

but. All left the room - except Henry (leave out Henry). If goes back to give. In If you see an honest man, you see a happy one the relation is not between honesty and happiness, but between responses: If you can say honest, you can say happy. Such a paraphrase is only half the solution. It demonstrates that if is controlled by a verbal rather than a non-verbal relation, but it does not get rid of the relation or the term if. At this point, however, we may examine the behavior of the listener. He is mandated to make one response whenever he can make another. In saying We shall go tomorrow if it does not rain, we are saying essentially that the response We shall go and It does not rain are to be made tomorrow with equal assurance. If the listener, on the morrow, can react appropriately to It does not rain, then he can also react successfully to We shall go.

The goal of such an analysis is not to reach a logically equivalent paraphrase. It is simply to get back to a form of response which has a more readily identifiable effect upon the listener. A Tookian[†] paraphrase generally converts a brief response of rather vague function into a longer, and, as it were, more muscular equivalent. The reduction of if to give makes the interpretation easier by showing first that if is a mand and second that it is the special sort of mand called an autoclitic.

It also suggests how much a subtle response could have arisen in a verbal environment. As in the case of the word chance, discussed in an earlier lecture, the etymology is a cue to a more conspicuous occasion upon which the response could have arisen. This sort of analysis is in general supported by modern linguistic and logical trends. Sapir's analysis of the word for is in the Tookian spirit, as is Quine's very revealing Elementary Logic, where many important autoclitics are carefully analyzed. Both Sapir and Quine are making empirical analyses, though their aims are quite different and both are different from the present aim. Here again we may note that a causal account, free of any concern with history or a comparison of languages, or with norms or standards for logical manipulation, has many advantages.

Tooke's notion of abbreviation has one other implication. An expanded paraphrase often seems very improbable. Do we actually tell the listener to leave something out of account when we say I have read all but the last two chapters? The answer is, generally, no. The response all but two is frequently a standard form controlled by a standard occasion, just as if we had said I still have to read the last two chapters. It is only upon genuinely novel occasions that a specific process of denying or excluding is evident - and then it may be painfully so. In this sense, which is probably close to Tooke's usage, abbreviation is the process through which reinforcing contingencies are established in the verbal environment which make a separate autoclitic response unnecessary. It is like the growth of a subtle abstraction, and many of Tooke's examples must, in fact, be classed with the latter.

Other autoclitics are so obviously mands upon the behavior of the listener that no argument is called for. Vice versa is the equivalent of change the order and react; in It is discussed in the third or fourth chapter or both the both enjoins the listener to combine the separate responses which precede (the response can have no effect otherwise); and so forth enjoins the listener to add

further responses of the same sort at will; Take England, for example, demands a reaction with respect to a given subject or theme; rather or on the other hand enjoins the listener to prepare for a contrary response; Let X equal the number of bricks one man can lay in a day demands a very complicated substitution in what follows; and so on. All in all the speaker pushes the listener around a good deal, but we may excuse his officious manner by noting that he is, after all, working for the listener.

Another sort of autoclitic response may be missed because there are no appropriate forms of response. The speaker simply puts in order responses which have already arisen under the control of other variables. In some languages this may be practically the only autoclitic process. By putting the tact to a color near the tact to an object, the speaker induces the listener to react as if the object has that color. In a red book on a leather chair the adjacency of red and book and of leather and chair prevents the listener from reacting as if a leather book were on a red chair. This is more than simply emitting the four main tacts, but there is no additional autoclitic response.

In other languages there may be fragmentary autoclitics which serve the same function. In Latin, for example, the effect upon the listener is achieved by adding to the response to red the fragmentary ending which appears on the response for table in the same total response. But these so-called inflectional devices generally do not employ responses exclusively concerned with this function; as in the case of ordering, material is used which is already strong for other reasons. The fragmentary response added to the response for red was strong because of a vestigial sexual connection of obscure origin - the so-called gender of the noun for table. It is the autoclitic use which seems to explain the survival of these otherwise useless fragments.

These examples suggest that the principal function of grammar is autoclitic, and this is supported by still another case. We have seen that the moods are used by grammarians as a classificatory scheme not unlike the present classification of the principle types of verbal behavior. The formal signs of mood, which were part of language before any analysis had even been made, enable the listener to infer the type of verbal behavior which is emitted. They function exactly like the descriptive autoclitics I declare, I ask, I demand or I wish, which correspond fairly closely with the indicative, interrogative, imperative, and optative moods. The formal marks of mood also serve in many cases to indicate the adequacy of the conditions responsible for an utterance. For example, a given subjunctive may indicate a condition "contrary to fact." Mood is therefore an autoclitic device which, like descriptive autoclitics, permits an inference of both type and strength of response. A causal analysis of verbal behavior provides a framework for an effective treatment of grammar, but there is, of course, enormous resistance to such a change.

We are now ready to analyze the larger sample of verbal behavior called "sentences." It is commonly asserted that the sentence, not the word, is the unit of speech. The word, abstracted from verbal behavior, has become so lifeless that it scarcely resembles behavior at all. But the sentence, as a collection of words, is no better off. The difference which has been appealed to is that words designate

while sentences assert and predicate. This seems to show that at least the reference of the sentence has more life than the referent of the word. But the effort to make every sentence correspond to a logically complete idea has been costly. Some sentences (for example, It's raining) do not predicate the coexistence of two conditions and hence do not seem to stand for ideas in this sense at all. Others (for example, So red the rose ...) do not assert the coexistence of the two key conditions which they name. Such sentences must therefore be called incomplete; they are said to "imply" what is left out.

Our own unit of the verbal response does not require any such maneuvering. It is already a dynamic part of verbal behavior, and the differences which arise when complex stimuli are in control and when verbal behavior itself becomes an independent variable in control of other behavior have nothing to do with the unit of behavior as such. The predication of two responses, which may be more appropriately discussed in connection with verbal thinking, is not a process which is useful in defining a unit. The larger samples of behavior here called sentence is behavior which arises from a complex set of controlling variables. No special pattern or organization is assumed. Different sets lead to different sorts of sentences. One part of a sample may enter into the determination of other parts. Autoclitics will usually appear. The total result is verbal behavior in its most familiar form.

Any demonstrable order should first of all be referred to the processes already considered. In particular, no logical principle is assumed to control the behavior. A well known theory, due to Wegener, holds that the later parts of a sentence progressively correct earlier parts. Herbert Spencer recommended an order - from abstract to concrete-which would minimize correction. Thus, by saying horse first and black later, Spencer argues that the French could avoid possible erroneous reactions to a horse of another color. The English order of subject and predicate generally proceeds from a specific object to a general property. The order of words in Chinese is from general to particular - just the reverse of the directions on an envelope. Order is peculiar to a language and to a large extent to the individual and must be accounted for by appealing to intraverbal or other functional relations.

Latent verbal behavior is non-autoclitic. It is only after primary behavior is at least in the course of emission that it can supply the required variable for an autoclitic response. Large units of behavior, existing in strength as units, may contain forms which were at one time autoclitic but are no longer so. They may be emitted as wholes, in established patterns and with appropriate grammatical tags but an autoclitic process is lacking at the time. A sentence which is emitted upon a novel occasion is composed of ungrammatical and unordered material. The only orders which exist in that state are those which serve for the "semantic" differentiation of response forms and those which arise because some responses are stronger than others and hence stand first in line. Any further order must come from intraverbal relations effective during the act of emission and from autoclitic activities.

Behavior is sometimes emitted in essentially its latent form. In hasty speech there may be no time to supply autoclitics, and the behavior will not be completely ordered and may be lacking

in grammatical tags. In composing a cablegram we may not be able to afford the autoclitics; the order is free. In headlines the lack of space frequently squeezes out the autoclitics. A sore jaw has the same effect. Broken English is usually close to the latent form, for autoclitics are acquired[†] relatively late. And only a few autoclitics found their way into the speech of Mr. Jingle in the Pickwick Papers:

Played a match once - single wicket - friend the
Colonel - Sir Thomas Blazo - who should get the
greatest number of runs - won the toss - first
innings - seven o'clock A.M. - six natives to look
out - went in; kept in - heat intense - natives all
fainted - taken away - and so on.

Here the order is intraverbally determined by the original order of events, but most assertive and manipulative autoclitics are lacking. The adjustment of the behavior to the occasion is at a minimum, and the resulting behavior of the listener could easily go wrong.

The problem of the sentence is to show how ungrammatical and unordered material is brought forth in a productive form upon a given novel occasion. Several variables are operating at once, and more are generated as the behavior proceeds. Some of this is clearly due to intraverbal processes. The first responses to be emitted, in a language which employs grammatical forms, are given tags. These may not be due to any special condition of the controlling variable, or any latent condition of the behavior. Each speaker has a preferred set of tags, although these preferences may shift as the result of intraverbal processes. He may at a given moment tend to give the first strong response a tag which identifies it as a noun. The tagging of other responses is then immediately determined. Some other response will probably be a verb and the appropriate tag will be supplied through an intraverbal process. For example, if the two main features of a situation are a horse and a neigh, most speakers would begin with the response for horse and add an autoclitic which makes it a noun: The horse. The tag -s or the equivalent is and the tag -ing is then inevitable. The final response is The horse neighs. But, as one writer has pointed out, it would be equally possible, though not very effective in an English-speaking community, to say The neigh horses. In English this suggests a Platonic neigh which gets itself substantialized in a particular horse, but this is a function of the community. Order and grammatical tags follow different plans in different languages.

The process of "putting in the grammar" often goes wrong. The common mistakes in grammar are easily analyzed in these terms. When a verb is given a wrong ending because a noun which is near at hand is not actually its subject, an intraverbal process has miscarried in an obvious way. And there are "mistakes" which are not strictly grammatical mistakes. A detective story contained the phrase my good common streak of hard sense and determination. We may plausibly argue that the latent material would ordinarily be put in a different order. It was probably the streak which was hard and the sense which was both good and common. But the latent pairs are torn limb from limb; my good common streak of hard sense and determination.

A single latent store may, of course, lead to different

orders and grammars, and a good deal of rewriting consists of trying out different schemes. I once wrote Before the reinforcement of a verbal response can be effected, the response must be elicited. My predilection for the noun reinforcement, under which you have all patiently suffered, forced the rest of the material into an awkward form and demanded the addition of the empty response can be effected. A simpler version is Before a verbal response can be reinforced the response must be elicited, but this contains an unnecessary repetition of response. To make a long sentence short, I finally arrived at To be reinforced, a response must first be elicited, which is about half as long as the first version but covers the same latent material.

The type of sentence which requires special treatment here - which does not exist as a standard unit appropriate to a standard occasion - does not begin life as a whole. There is nothing in one's latent verbal behavior which corresponds to its final form. Perhaps we are not often as completely empty-handed as the character in War and Peace who "did not know himself what he was going to say, but ... began eagerly, using bookish Russian, and occasionally lapsing into French." Usually we have a few fragments on hand, which would be emitted in broken English in roughly the same form. Dean Briggs, upon the occasion described in the last lecture, began with the response unvarnished tale, and made a successful sentence of it by adding material from an overlapping variable. And we have also considered a metaphorical frame which is often used when no suitable material is available to complete the comparison: He is as stupid as. This is often followed by the crudest patchwork, but we must remember that it may also be followed by an apt figure. Many a logical antithesis has started off on one leg, to end up happily enough on two - of greater or less artificiality. A predilection for beginning with subordinate clauses has left many a sentence hanging in the air but it has also produced highly satisfactory results.

The good extemporaneous speaker is one who has this process under control. He launches himself upon a sentence only when the prospects for completion are good, and abstains when the materials are deficient. But he can not do this by considering the material in detail. He must be especially sensitive to rather subtle and vague properties of large masses of incipient behavior. A speaker may use certain devices to stall for time, when material comes slowly. The troubadours had standard lines for this purpose and we have not entirely lost the knack. Many a man has begun In this connection it is interesting to note when no response in his behavior was at the moment notable in any connection, but this introduction has also been followed by many wise remarks which have arrived on the scene in the nick of time.

In this rather cynical account we have not neglected what a sentence expresses if we have adequately accounted for the verbal behavior itself. There is no reason to consider any preverbal entity between the variables and the behavior. Our formulation will account for the anomalies often put forth to demonstrate such an entity. Thus we are prepared to handle two words which express the same meaning, or two sentences for the same idea, or two grammars for the same latent behavior, without bringing in any entity which is not among our variables. Verbal behavior is emitted under the control of a world of facts and things

and under circumstances in which one response may be controlled by another. Some of the resulting sentences may be effective in leading the listener to react successfully with respect to the corresponding state of affairs. Others may not. Some may be more comprehensive than others. Some may be more strongly supported by autoclitics of assertion, and some may be controlled by coexisting states of affairs which lead to autoclitics of predication. But any "fact" must be found among our variables, and if ideas are more than the facts, then they must be verbal behavior itself. In this sense we do not express ideas, we make them. And some sentences are better ideas than others.

We stop talking with respect to a given state of affairs when we get an effect. If one attempt leads to nothing, that particular pattern of order and grammar will be to some extent extinguished. In a person with an extensive verbal repertoire, alternative patterns will emerge. The same latent material is "said" in different ways. This is all we can do by way of "expressing an idea" - we can simply emit response after response until an effect is achieved. The process is not quite blind, because effective fragments of response may be repeated, and a final effective form gradually constructed. The disciplined intraverbal practices of scientific and mathematical thinking also make the process more effective by hastening the rejection of bad tries and strengthening likely possibilities. But the process is still "emit and see what happens."

When the speaker is his own listener, much of this activity may be hard to follow. The behavior may be subvocal or merely incipient, and the speaker himself may not make the kind of response to it which gives rise to awareness.[†] Many steps are then completely lost. But this does not alter the plausibility of the formulation, which is the important thing here. The case is defined by the fact that verbal behavior acts upon the speaker as a reinforcement. And here again the result is often attributed to the self as a controlling agent. The order of events is as follows: A verbal response is strengthened by a given set of circumstances and is emitted, at least incipiently or subvocally. It affects the speaker himself exactly as an audible response would affect another listener. It may strengthen the response or weaken it. If it strengthens it, the response will probably then be emitted audibly. If it weakens it, it will be rejected. When we try a witty remark silently and decide that it is worth saying, we exemplify the positive case. We exemplify it, less happily, when we repeat a response which was audible in the first place. The teller of a funny story sometimes repeats the punch line after the laughter has subsided because of this added strength.

The negative case is much more complicated. The effect of punishment has been carefully studied in the field of non-verbal behavior, and it is not simply a weakening of response. There is something like active suppression. This depends upon the prior emission of the response. A response gets under way and acts as the stimulus for a conditioned emotional response due to previous punishment. We do not simply fail to emit the response, we actively suppress it. Clapping the hand over the mouth is a clear-cut example, but the controlling behavior is usually less drastic and less obvious. The fact that one response-system is clearly controlling another recalls our original problem. Our task is to account for the controlling

system without appeal to the speaker as a special self.

We react to our own verbal behavior and actively suppress it when, to put it crudely, we suddenly see that the response we are emitting will have an unfortunate effect upon the listener. It may be related to an unfortunate experience of the listener, or part of a sub-language which is not appropriate to the listener as an audience. It may be an ungrammatical response, or tawdry, or commonplace, or boastful, or obscene. It is always a response which has been positively reinforced by one audience and negatively reinforced by another. (The presence of a least two reinforcing communities in the history of the speaker is apparently always required - one to establish the response, one to punish it.) The present audience is negative.

The composition of a sentence can be divided into the act which supplies a verbal response and the act of accepting or rejecting it. This is what we mean by deliberating - by weighing one's words. The participating mechanisms are susceptible to analysis in terms of functional relations, but at different levels. In some cases they are located in different skins. The manner in which Talleyrand was accustomed to prepare state papers is well known. Talleyrand would assign a document to several collaborators, giving them only the vaguest idea of what answer he proposed to make. The collaborators would compose various drafts. To each, Talleyrand would say one of three things: That is not it at all; That's not it; or, That's not quite it. Each collaborator would then try again, making such changes as the particular verdict seemed to suggest. Eventually Talleyrand would exclaim That's it! And have his answer. The Hollywood producer and his script-writers often seem to function in the same way.

Different degrees of editing, like different proportions of autoclitics, yield different styles. The stream of consciousness technique simulates an unedited flow of verbal behavior. At the other extreme is the compact style which results when a dozen sentences are emitted vocally for every one put down in writing. Automatic writing is the clinical version of the stream of consciousness style. The inability to tact one's own verbal behavior which is characteristic of automatic writing is important at just this point, for no editing is possible. The usual characteristics follow from this fact. Automatic writing may be ungrammatical, childish, obscene, hackneyed, trivial - it may be everything which would be suppressed by the writer if he had reacted to his behavior. The recovery of early memories, one of the most dramatic results, is explained here exactly as in the preceding treatment of the audience. The psychoanalyst establishes himself as a non-censuring audience. He works to extinguish the emotional conditioning which is basic to the suppression of behavior. The behavior which is thus released may be surprising even to the speaker. But no audience at all, as in the case of automatic writing, is even a more favorable condition. The practiced writer is able to evoke a semi-automatic condition in which verbal behavior is especially likely to be evoked. As I have shown elsewhere, Gertrude Stein developed this ability experimentally in the Harvard Psychological Laboratory long before she put the same product on the market as ultramodern verbal art.

The various ways in which a speaker encourages his own verbal behavior

also need to be considered. Here again it is not the speaker who originates or controls. But long experience in emitting verbal behavior, especially under weak determining conditions, as in the case of the professional writer or speaker, develops various practices for getting behavior out. The condition under which verbal behavior needs to be encouraged can be described as a prior contract which does not specify the whole behavior. A quite non-specific contract is exemplified in to Say something. Other contracts specify themes: Write a sonnet on Dante, Tell us about your vacation, and so on. All of these cases represent a variable which establishes a strong drive to say something but only partially determines the form. The speaker must fill in the missing variables in one way or another.

If the required behavior is already part of the speaker's repertoire, he will do well to follow the present analysis. Thus he may arrange for a favorable audience as an optimal occasion. The manner in which the unpublished but widely circulated manuscript of Wittgenstein was written is an example. Wittgenstein would meet with a group of sympathetic students who comprised a highly favorable audience. He would simply talk. What he said would be taken down stenographically. A typed copy would then be given to Wittgenstein, who altered it for a second draft. In this way a very weak latent verbal reserve was given a permanent form. The case is not too far removed from that of Talleyrand, except that producer and editor are here in the same skin.

We have already seen that certain kinds of situations have the same effect as a suitable audience. Some which have been used by professional writers may be quite dramatic. In order to work on his celebrated natural history, Buffon found it necessary to dress himself meticulously and to sit in a special summer house attended by servants. Houseman wrote many of the poems in the Shropshire Lad with the aid of a pint of beer and an after-luncheon walk. Hundreds of comparable processes can be discovered in the biographies of writers.

In encouraging particular responses, the speaker or writer may use the techniques of supplementation described last week. By going over the words in a rhyming dictionary, for example, the rather precise specification of a verse form may be filled with responses which have some strength in the poet and hence some relevance. The running start obtained by reading over what one has just written is a thematic probe or prompt for the behavior to follow. By selecting various limited prompts or probes, the speaker may sometimes fill the very different contracts to be witty, to use good metaphor, and so on. Many other practices of this sort are familiar to the experienced writer.

A contract for verbal behavior which does not exist in the speaker's behavior demands another sort of controlling activity. He must acquire additional verbal behavior. If he is to be paid for writing a sonnet on Dante, for example, he may well visit Florence to build a supply of facts. If that is inexpedient, he may well read a book or two on Dante to build up an intraverbal repertoire. If he has never written a sonnet, it will be well to read some sonnets to build up the formal tendencies needed. Thus prepared, he may then blossom forth with Dante, "Thou should'st be living in this hour. Thou must be ... "

But in the long run he may emit a new verbal pattern which meets the specifications by utilizing the materials thus acquired.

Another more sophisticated way of getting novel responses is to permute and combine those which the speaker already possesses. Mathematicians and logicians are always doing this to get new theorems or equations or propositions to be tested. It is done by the less disciplined. There is a mechanical device which will generate new plots for short story writers. This is only a modern refinement upon a process of long standing. A good part of French drama was apparently generated by placing people of different sexes and marriage ties at the corners of a triangle or quadrangle and by raising the question of love versus duty at each corner. New ideas may be generated in the same way. A favorite device is to invert a standard order, or to insert not in a standard sentence. This made Oscar Wilde famous. Similar permutations are often performed upon one's own previous verbal behavior.

We thought her dying when she slept,
And sleeping when she died.

Here, the poet makes a second line out of the materials of the first by a characteristic inversion. It is moderately successful in this case but may often lead to nonsense. Many standard rhetorical terms refer to mechanical manipulation of verbal behavior in this way. They are all high order conditioned behaviors which are reinforced eventually by their effectiveness as in generating verbal behavior. It would be a mistake to identify these practices with literature alone. An analysis of this sort is not only relevant to the problem of how to write. It is the very crux of the question of how to think as we shall see in a later lecture.

I am aware that much of what I have said has been very sketchy. "Making sentences" is too big a topic to be covered in a single lecture. But perhaps I have made my central point. The speaker as a causal agent has no place in a scientific account of verbal behavior. The control always goes back to the environment and to the history of the organism. Those activities which seem at the moment to exemplify control are in themselves only another kind of behavior, which we have a reasonable chance of accounting for as a science of verbal behavior is further developed.

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CHAPTER SEVEN: The Effect Upon the Listener

Most theories of meaning turn from speaker to listener and back again with no regard for the fact that their behaviors are very different. The practice is encouraged by the concepts of "word" and "meaning." When these have been abstracted from verbal behavior, they are assumed to be common to both speaker and hearer. The same words are said to have the same meaning for both of them. But if we trace these concepts back to the observations upon which they are based, we expose the error in the assumption. No matter how we may define a word from the point of view of the listener, it is clearly not the same word defined from the point of view of the speaker. Nor are meanings, when operationally defined, the same in the two cases.

The fact that speaking and listening are different kinds of behavior and must be treated separately has been strictly respected in the present analysis. We have so far been concerned exclusively with the behavior of the speaker. The listener has been appealed to merely as part of the verbal environment which is responsible for reinforcement of the behavior of the speaker. The listener himself has not only not been systematically studied, he has frequently been described in terms which are useful only in casual discourse and which must now be replaced. For example, a given response might have been shown to be reinforced because the listener could draw certain "inferences" from it. But "inference" needs to be defined if it is to be used rigorously, and there may be no place for it in a careful analysis.

The behavior of the listener is not essentially verbal at all. When the listener is also behaving as a speaker, his behavior is verbal because it has consequences which bring it within the scope of our original definition, but listening, as such, is not covered by the definition and differs in no important way from responses to non-verbal stimuli. A non-verbal parallel can always be found for the cases which follow. The behavior of listening is, however, always conditioned, and it is conditioned under circumstances which involve the behavior of a speaker. This fact is important for a final definition of verbal behavior and our account would be incomplete if the listener were ignored.

The listener comes to react to the behavior of the speaker as a stimulus which has in the past accompanied other stimuli, verbal or otherwise. Because of this contiguity the verbal stimulus may acquire three kinds of control. It may function as a conditioned eliciting stimulus, where the reaction of the listener follows the pattern of classical Pavlovian conditioning. It may function as a discriminative stimulus which sets the occasion for successful operant behavior, verbal or otherwise. And it may function as a conditioned reinforcer. Each of these cases needs careful attention.

Classical Pavlovian conditioning seems to apply exclusively to the reactions of glands and smooth muscles. The examples which apparently invoke the movement of the organism in space can be interpreted otherwise. Pavlov experimented mainly upon the salivary reflex, which is not a very important

part of human behavior. But emotional responses are of the same sort and constitute an important field. The verbal behavior of the speaker frequently accompanies states of affairs which are unconditioned or previously conditioned stimuli for emotional reactions. Thus, if one is afraid of snakes, and if the verbal stimulus snake has sometimes accompanied real snakes, the verbal stimulus alone may evoke an emotional reaction according to the Pavlovian principles.

This effect generally arises as a by-product of the more practical behavior to be described later. The listener's reaction does not operate in any important way upon the environment and is seldom in itself reinforcing to the speaker. The contingency between the verbal stimulus and the emotional state of affairs is incidental to other functional relations. But if the emotional behavior of the listener is for any reason important to the speaker, it may alter the strength of the behavior which gives rise to it. This produces, as we have seen, an impurity in the tact relation. In the extreme case, a response may be emitted only because of its emotional effect upon the listener.

A conditioned emotional stimulus is of greater practical importance when it comes to control a disposition to act which involves the movement of the organism in space. Such a disposition may or may not be accompanied by the glandular and smooth muscle activities which have been classically regarded as the emotional response. The disposition is not a response, but rather like a drive, a state of strength of a group of responses. The stimulus which controls it is susceptible to Pavlovian conditioning. In a common case a strong predisposition to react may be created favorably toward the speaker. Thus, by increasing the generosity of the listener, we may induce him to pay the check. We do not necessarily mention the check. We do not specify any form of behavior, and the response is therefore not a mand. But it may be more successful, for Please pay the check could have no effect whatsoever. In another common case, the speaker incites the listener to take action toward someone else. The political speaker reviews the abuses of a person or faction in order to induce appropriate behavior - violent or non-violent. He will probably also emit responses which specify the form which the listener's behavior is to take: Down with the usurper; or, Vote for Plan E; but the recital of abuses merely bids up a supporting disposition.

The contiguity between the verbal stimulus and the unconditioned emotional stimulus may not coincide with the concurrent practical contiguity. A concrete term usually has a much greater emotional effect than an abstract, though the latter may be more effective for other purposes. The difference is that the concrete term has probably coincided with more emotionally effective stimuli. Emotionally charged words may actually get in the way of effective practical results. The tone of voice or the very form of the response - whether, for example, it is in one's native tongue - may be the effective emotional stimulus, while the phonetic pattern is having another kind of effect. In experiments on scrambled texts, it has been found that part of the emotional response survives even though the text becomes otherwise unintelligible.

The listener may not need to be aware of the relation

which affects him. A sudden anxiety or mood may arise from a verbal stimulus in which we cannot identify the effective element. In one case in my own experience I was not even aware that a stimulus had acted. I was working at my desk and suddenly felt a mild anger. It was some time before I discovered that a word I had written resembled a proper name which at the time was emotionally charged for me. There are no time limits on reactions of this sort. In other kinds of listening, too long a verbal stimulus leads to fatigue or a complete absence of response, but the longer the stimulus the greater the emotional reaction, according to the well-known principle of the accumulation of emotional effects. Nor is what we shall later discuss as the "belief" of the speaker always required.

All of these characteristics are especially clear in reactions to literary stimuli, and literature is, of course, the field in which the emotional reaction of the listener - more appropriately called a reader - is predominant. The reader need not actually do anything about a poem by way of acting upon the environment. Reading need not involve more than a few very small muscles. Yet the results may be very extensive and very important.

The substitution of one stimulus for another in the conditioned reflex has suggested a biological basis for the logical notion of sign or symbol, and it has been heavily emphasized in liberal theories of meaning. It is useful in this respect only in treating the behavior of the listener. The speaker's behavior must continue to be described in the "use of signs and symbols." But even in the case of the listener, the so-called semantic relation of reference is not adequately represented by the conditioned reflex formula. Consider, for example, the following quotation from Bertrand Russell's Inquiry in to Meaning and Truth:

Suppose you are with a man who suddenly says "fox" because he sees a fox, and suppose that, though you hear him, you do not see the fox. What actually happens to you as a result of your understanding the word "fox"? You look about you, but this you would have done if he said "wolf" or "zebra." You may have an image of a fox. But what, from the observer's standpoint, shows your understanding of the word is that you behave (within limits) as you would have done if you had seen the fox. Generally, when you hear an object-word which you understand, your behavior is, up to a point, that which the object itself would have caused. This may occur without any "mental" intermediary, by the ordinary rules of conditioned reflexes, since the word has become associated with the object.

The passage contains two autoclitics (within limits and up to a point) which indicate that a clear state of affairs is not in control, and this can easily be demonstrated. The simple fact is that we do not behave toward the word "fox" as we behave toward foxes, except in the limited Pavlovian case. If we are afraid of foxes, the verbal stimulus "fox," which we have heard in the presence of real foxes will evoke an emotional reaction. If we are ready for a hunt, it may arouse a positive response which we might call excitement or delight. Probably the imaginal "seeing a fox" can be fitted into the Pavlovian formula also. But the verbal stimulus "fox" does not, because of simple Pavlovian conditioning, lead to any practical behavior appropriate to

foxes. It may, as Russell says, lead us to look around, as the stimulus "wolf" or "zebra" would have done, but we do not look around when we see a fox, we look at the fox. Only when the concepts of stimulus and response are used very loosely can the principle of conditioning serve as a biological prototype of symbolization.

Practical behavior with respect to a verbal stimulus follows the same three-term relation which has already been so extensively used in analyzing the behavior of the speaker. The case described by Russell is not clear in every detail, but we may suppose that in the history of this particular listener the stimulus "fox" has been an occasion upon which looking around has been followed by seeing a fox. (We may also suppose that the listener has some current interest in seeing foxes - that his "seeing-a-fox drive" is strong. The first term in the relation is a verbal stimulus.)

This means merely that we can alter the present response to "fox" by satiating the behavior of seeing foxes. The listener will not respond if foxes are running all around him. On the other hand, if no fox has been seen for a long time, there is a condition of deprivation and a strong response will follow. [. . .][†] which gains control of the second term, a non-verbal response, because of a double contingency with the third term, a reinforcement. This is a discriminated operant, rather than a conditioned reflex, and the difference is important. The verbal stimulus "fox" affects the listener as an occasion when a number of responses with respect to foxes will probably be reinforced. By turning around he may see a fox; by getting on his horse he may shortly find himself pursuing one. These are responses to the verbal stimulus "fox," not as a substitute for a fox, but as an occasion upon which responses have been, and probably will be, reinforced by a fox. The behavior which is controlled by the fox itself - looking toward or riding after - cannot be made to the verbal stimulus, and there is therefore no possibility of a substitution of stimuli.

When the cook tacts[†] a given state of affairs by saying Dinner's ready! She creates a verbal occasion upon which one may successfully sit down to the table. But one does not sit down to, or eat, the verbal stimulus. The word "Dinner" contains no nourishment whatsoever. The kind of response which one can make to both the dinner and the verbal stimulus dinner is exemplified by the salivary response. This is conditioned according to the Pavlovian formula, and with respect to that response the verbal stimulus might be called a sign or symbol of the dinner. But the practical behavior which is responsible for the development of verbal behavior in the first place, must be formulated as a discriminated operant involving three terms, no two of which provide a parallel for the logical notion of a symbol.

A complete picture of the combined behavior of speaker and hearer can best be given with a set of interlocking paradigms such as those which have been put on the blackboard.[†] A total act of speech is accounted for in each case by listing the events in the behavior of both speaker and hearer in temporal order. The exchange between the two organisms, indicated by arrows, is entirely physical. The drive underlying each response

is specified, and the reinforcing sequences explain the origin and continued maintenance of each response. The basic three-term relation is clear in each case.

Thus in Paradigm I we assume a hungry speaker and a listener who is an appropriate audience for the mand Bread. This is the special type of mand called a request, and we also therefore assume that the listener is motivated to give bread to the speaker. The first physical interchange takes place when the listener as an audience provides the occasion for the speaker's response. This response produces the verbal stimulus Bread which is an occasion upon which the listener may successfully offer bread to the speaker. The bread given reinforces the speaker's demand. It also constitutes the occasion for the curious response Thank you. The number of times a child must be told to say Thank you suggests that non-educational reinforcement is not powerful, but the net social gain is clear. By saying Thank you, the speaker reinforces the listener's response with a consequence appropriate to the assumed drive, and increases the likelihood of similar behavior in the future. If the listener then says You're welcome, the speaker's Thank you is in turn reinforced, and in polite society a few additional murmurs may carry the chain still further, until the direction of any remaining obligation is obscure.

When the demand is of the special type called an order or command, the same paradigm holds except that the speaker's response now carries extra-phonemic properties which establish a threat. This replaced the drive which had to be assumed for the listener in the first paradigm. Giving bread to the speaker again reinforces the listener's response. If the threat is a mild one, Thank you may be worthwhile in guaranteeing a similar result next time. This more obviously cancels the threat and further reinforces the listener.

A typical interlocking paradigm for a tact has other features. Here we assume a generalized drive on the part of the speaker, and a strong drive on the part of the listener. In other words, the tact is operated for the listener's benefit and is maintained in the speaker only through a generalized reinforcement. In the example on the board, the speaker responds to a state of affairs consisting of a telephoned request to speak to the listener, and the listener himself as the necessary audience. The speaker may have to go from the phone to the listener to compose this double stimulus. The response Telephone produces an occasion upon which the listener has previously successfully answered the telephone. This response is therefore now strong and is emitted. In order to keep the speaker's behavior in strength the listener may say Thank you, which, crossing the physical line from one organism to another, reinforces the speaker's response in a manner appropriate to the generalized drive. The listener's behavior is reinforced by successful behavior with respect to the state of affairs which served as the original stimulus for the speaker.

In the paradigm for the tact we might also enter a conditioned glandular or smooth-muscle response. Perhaps the listener has frequently received calls from someone with whom he is in love. Past occurrences of the verbal stimulus Tele-

phone have preceded emotionally exciting conversations on the phone, and some of this emotional excitement therefore comes under the control of the verbal stimulus. This is collateral behavior which has no functional connection with the main business of the tact paradigm. But the speaker may to some extent be reinforced by evidences of the emotional reaction, and like the boy in the fable he may cry Telephone when no call has come in. The response has broken loose from the stimulus and is now under the control of a specific drive, as in the case of a demand because we cannot draw up a suitable paradigm which will account for the maintenance of the behavior of both speaker and hearer. The speaker trades upon past instances which have followed the paradigm for the tact. Conversely no demand for an emotional response on the part of the listener can ever arise except through magical extension. We can not draw up a paradigm for a demand in which the listener is responding by weeping or salivating. The required interchanges are impossible.

An analysis of this sort always seems to do violence to the temporal dimensions of behavior. All of the events represented in one of these paradigms might take place in two or three seconds. But this does not invalidate the analysis. In general it is possible to interrupt such a chain of events to demonstrate the reality of each link. The important function of the interlocking paradigm is to permit us to check the completeness of our account. Have the behaviors of both speaker and hearer been fully accounted for? Have we identified an appropriate drive and shown that the reinforcement received is appropriate to the drive? Have we correctly represented the physical interchange which takes place between the two organisms? If so, then our analysis is at least comprehensive, if not profound, and we have accounted for the complete act of speech. It must be noted that this is not taken to by any supra-organismic entity. Such a paradigm contains nothing except processes to be observed in the behavior of an individual. By assuming the conditions supplied by the listener, we account for the behavior of the speaker, and vice versa. By putting the two cases together we see how such an episode naturally arises and completes itself.

In these examples the listener emits a non-verbal response. The verbal parallel raises no special difficulty. Instead of giving bread, the listener might have been demanded to say Uncle. One of the responses which might be made to the verbal stimulus Telephone is Good, or Just in time. The paradigms will receive a verbal response without other alteration. But the verbal behavior of the listener is extraordinarily important, as we shall see when we come to consider the remaining kinds of behavior in which he may indulge, and in the present case, it provides the framework for dealing with what is often called a cognitive response.

It might be said that the most important result of hearing someone say "fox," under circumstances where this is clearly a tact, is that the listener now "knows there is a fox in the neighborhood." But what is the behavior which supports or is identical with knowing? Is it merely the sum total of all the things he will then do with respect to foxes? This may be the most useful practical equivalent, but it will not satisfy the listener himself. He may do all of these things at one time or another in essentially the same way with respect to other

animals, as Russell points out. Any primarily practical response which respects the zoological classification alone will be rare. Is there not a unitary response which is appropriate only to foxes and by virtue of which the listener may be said to recognize a fox? In answering a question of this sort it is important to note that one of the things we may do when someone says "fox" is to say "fox" too. A tendency to make the response follows from the fact that any situation which is the occasion for a successful response of the same form in another speaker [. . .][†] The behavioral process is echoic. The kind of reinforcement which was specified in defining the echoic case is present. But we may recall that an echoic response differs from a tact merely on the point of a basic unit repertoire. The listener's echoic fox may contain an admixture of a demand which might be expanded into Did you say "fox"? But the significant relation which is here of interest might lead to an expanded response of the form A Fox! Think of that! The expression Think of that! Is illuminating because it is precisely "thinking of a fox" which is to be the cognitive response appropriate to the verbal stimulus fox. When we come to discuss verbal thinking, we shall see how important it is that the verbal response fox is available as the appropriate response to foxes when no other practical step is taken.

To say fox is not the same as being passively reminded of a fox; it is an active response commonly made in situations which contain foxes and here evoked by a verbal stimulus.

Complex stimuli will fit into these paradigms if the listener has acquired a response appropriate to the whole pattern. The verbal stimulus Telephone leads to one response, The telephone is out of order to another. The function of a context can be analyzed in terms of complex stimuli in this sense. The stimulus fast leads to one response in one context[†] and to an entirely different response in another. The context may be verbal or non-verbal.

The only limit to the size of verbal stimuli which will be effective without raising any special problem is set by the experience of the listener. In certain professional positions listeners become accustomed to hearing large samples of behavior repeated by different people in essentially the same way. They may make a simple response to samples containing hundreds of words. "It's the old familiar story." But most long samples contain some novelty and also stimuli like The telephone is ringing and The telephone is in use have been previously conditioned. The principles involved will be considered in a moment. The verbal stimulus The telephone is out of order may be effective even though the listener has never reacted to it before, provided stimuli like The radio is out of order and The car is out of order have.

The strength of the listener's reaction to a given verbal stimulus will vary with many things. The physical characteristics of the stimulus, whether it is clear and within certain speed limits, will be important, as will the past experience of the listener with respect to similar patterns. We listen closely to previously interesting speakers, to certain tones of voice, and we grow bored and stop reacting if we get nothing out of it. With respect to a particular speaker, our

behavior is also a function of what has been called "belief." We may deal with this by defining belief in terms of strength or response. My belief that there is cheese in the icebox is a function of my tendency to go to the icebox when I am hungry for cheese, other things being equal. My belief that there is a substantial table in front of me varies with my tendency to reach toward it, place things upon it, and so on. If I have just spent some time in a house of mirrors in an amusement park my belief in this simple fact may be shaken, just as my belief about the cheese would be quickly dispelled by an empty icebox. My belief in what someone tells me is similarly a function of my tendency to act upon the verbal stimuli which he provides. If I have always been successful when responding with respect to his verbal behavior, my belief will be strong. If any given response is strictly under the control of stimuli, with little or no metaphorical extension and no impurity in the tact relation, and if appropriate autoclitics disclose these conditions, I will react in maximal strength. In this sense, I "take his word for it." It does not matter whether he is a specialist with respect to his topic. Our confidence in the expert arises from the fact that he will tell us all about it. The non-expert may be equally well believed whenever he speaks if the above specifications hold, for he will simply stop talking when he does not know what he is talking about.

The various devices which are used professionally to increase the belief of the listener (for example, by salesmen or clinicians) can be analyzed in these terms. The clinician, for example, may begin with a number of statements which are so obviously true that the listener's behavior is strongly reinforced. Later a strong reaction is obtained to statements which would otherwise have led to little or no response. Hypnosis is not at the moment very well understood, but it clearly exemplifies a heightened "belief" in the present sense. The world is for a time reduced to verbal stimulation which is in practically complete control. The characteristic behavior of the listener appears in a dramatically intensified form. Most of the common hypnotic effects, however, need to be considered under a topic to be discussed in a moment.

It is not only the phonetic properties of the verbal stimulus which determine the behavior of the listener. As we have seen any intonational indicator of the type of response or its condition of strength or weakness will be effective. We respond with maximal speed to a demand which is obviously a demand, and in general we respond maximally to a strong, clear response. We do not fully believe in hesitant or frequently corrected speech. Extra-phonetic properties may be correlated with other conditions important to the listener. Clumsiness in speaking, a choked voice, or a poor ordering or other use of autoclitics, have an effect. The "inference" which the listener draws from the degree of metaphorical extension or the magicality of a demand is a relatively sophisticated and subtle case. The speech of persons in extreme states of emotion is characteristically altered. The inference from the speech to the emotion does not follow our paradigms, but is easily made. We may weep in response to O weep for Lycidas, not because we can weep upon demand or because the accompanying verbal stimuli are effective as impure tacts, or because the words are read with a grief-stricken

tone of voice. We may weep simply because we observe that an otherwise logically minded person has resorted to a type of response which he would ordinarily shun. This suggests the depth of his despair, and is to that extent effective.

We may summarize this part of the listener's behavior by returning to our example of Dinner is ready! If this verbal stimulus evokes salivation or any other response of gland or smooth muscle, Pavlovian conditioning has taken place. If the listener goes to the table and sits down, it is because the stimulus has served as an occasion for the successful reinforcement of such behavior in the past. Some of the properties may be effective in determining the strength of both types of response. Perhaps the cook has burned the meat or permitted the soufflé to fall and therefore says Dinner is ready in a faint, hesitant voice. An appropriate autoclitic might be I guess dinner is ready. In such a case the listener will walk to the table with less alacrity and with a drier mouth.

There are precisely parallel processes which do not involve verbal behavior at all. Thus, the roar of a lion may be a conditioned stimulus which arouses a fear reaction and a discriminative stimulus for decisive behavior of a more practical sort. Any characteristic which accompanies the roar of an especially hungry lion is similar to the non-phonetic properties which modify the energy level of the listener's response. The roar might be called a sign of a lion, but it is a conditioned eliciting stimulus only in the first case. Incidentally, if there is any difference between a sign and a symbol, it is at the autoclitic level. The distinction has been made that a sign is not necessarily "intended to mean anything." The simplest translation is that a sign is not essentially verbal under the terms of our original definition. An interlocking paradigm in which the lion plays the role of speaker would not provide the type of reinforcement needed to make its roar verbal, and the listener's behavior would not be itself verbal in either case. But a second distinction is also involved: an autoclitic of type, assertion, or predication is lacking. But a lion which roars for its supper at the zoo is behaving verbally according to our definition, although the case is too simple to arouse the interest of linguists.

A simple example follows the Pavlovian formula. We condition a glandular response - say, the sweating of the palms of the hand called the psychogalvanic reflex - by repeatedly presenting the sound of a bell and a shock at about the same time. The previously neutral sound of the bell begins to elicit the response which was under the control of the shock. We can make this case verbal with the trivial substitution of the verbal stimulus Shock for the bell. In a somewhat amplified case we might say When I say 'Shock' you will feel this: (and then administer the shock). The listener's behavior with respect to future occurrences of the verbal stimulus Shock would be changed. And when Shock becomes effective in this way, it may be paired with another verbal stimulus to yield a case which is wholly verbal: When I say 'Three', you will receive a shock. The effect upon the listener is a change in his future behavior with respect to the stimulus Three. In another variation on this theme, the pairing of verbal stimuli may make a non-verbal

stimulus subsequently effective. When you hear the bell, you will feel a shock. The later response to the bell is as non-verbal as the original Pavlovian examples, but it has been set up without using either the bell or the shock at the time of conditioning.

Close parallels are available in which the later behavior of the listener is a discriminated operant. When I say 'Three,' go, might be called a conditioned demand. It has no immediate effect which can be classified as a response, but the subsequent behavior of the listener with respect to Go is changed. In another variation the stimulus which is later in control is non-verbal. When the fire burns out, close the damper leads to subsequent behavior under the control of a non-verbal stimulus arising from the fire. Both of these examples are demands, but parallel cases for tacts are obvious. When I say 'Come and get it,' dinner will be ready gives the verbal stimulus Come and get it the same discriminative function as Dinner is ready. When the kettle whistles, tea will be ready gives the same control to the non-verbal whistling of the kettle. Examples comparable to the last two in which the listener's subsequent behavior is verbal call for only a trivial modification of the formulae.

These effects upon the listener may properly be called instruction. They are easy to state, but they have been the subject of much discussion and conflicting experimentation. Part of the difficulty has arisen from an inadequate formulation. The pairing of stimuli - whether both are verbal or one is non-verbal - has seemed to indicate a strict Pavlovian principle. But the behavior subsequently controlled may be operant, and a strict substitution of eliciting stimuli is, therefore, an inadequate framework for representing many cases.

It is also commonly objected that the change in the listener cannot be conditioned because the process is too fast. A single verbal stimulus - say, Germany has invaded Poland - may have subsequent effects which could be duplicated only with weeks, or months, or years of experimentation. But the full effect of such a stimulus also requires years, as may be seen by examining the effects upon children at different ages. And even so, many listeners may have to hear such a remark several times before fully "appreciating what it means." The apparent temporal discrepancies may be traced to the undue emphasis which has been given to Pavlovian conditioning. In the animal laboratory the usual conditioned reflex requires many pairings of stimuli, and this is usually true for glandular and smooth-muscle responses in the human subject. But operant conditioning characteristically shows an effect with a single contingency, even in animals as far down the scale as the rat or pigeon. That the human subject is able to make an exceptionally extensive change in his behavior as the result of a rather slight verbal episode must be accepted as a fact. No theoretical deficiency can put it in question. Our present position protects us from surprise in any quarter, for we are describing behavior, not explaining it by reference to processes in some other field of discourse. If a change takes place with lightning speed, then it takes place with lightning speed. That is all. The formulation is not affected, for it is merely a statement of the temporal and

intensive relations among our variables, made with the purpose of bringing each example under a general formulation. In the present case the variables are usually quite clear. The results may be extraordinary, but they are not conflicting or unbelievable.

Some of the exceptional speed in verbal instruction is due to the autoclitic frame which carries the primary paired terms. When we bring a naïve subject into the laboratory and present pairings of the sound of a bell and a shock, it may take him some time to "learn the connection," as we say. We can shortcut most or all of this by simply telling him Whenever you hear the bell, you will receive a shock. The greater speed must be attributed to the difference between the cases, and this difference is simply the autoclitic frame When you hear the . . . , you will receive a This is effective because many similar patterns have been conditioned upon past occasions.

The autoclitic frame is, as we saw last week, designed precisely to intensify the effect upon the listener, but the behavior process in this case requires careful formulation. We observe that a standard stimulus - the autoclitic frame - is consistently present when two stimuli occur together under circumstances which make conditioning expedient. When stimuli occur together because of circumstances under which conditioning is not expedient, the frame is lacking. The observed result is that conditioning eventually takes place rapidly in one case and slowly in the other. The behavior of young children shows that the development of an effective frame requires time, but how the process operates is not wholly clear. Perhaps the autoclitic merely intensifies the response to each of the paired terms and the speedier conditioning follows from this fact. But the function of the autoclitic of assertion suggests that some effect is also felt upon the process of conditioning itself. (The comparable case has never been set up in the animal laboratory. It would consist of a long series of conditioning procedures, in some of which stimuli were paired with respect to stable consequences while others were paired adventitiously and hence useless in the formation of successful responses. A third standard stimulus would be present whenever the pairings[†] could lead to successful behavior. In the test case two new responses would be conditioned, one in the presence of the standard stimulus, the other in its absence. If the standard stimulus produced quicker conditioning its effect would be comparable with the autoclitics just discussed.)

Although the conditional autoclitics supply the most obvious examples, they are much less common than the other autoclitics. The instructional effect of it is seen in both definition and predication, where it facilitates a rapid transfer of response from one term to the other. A definition equates two verbal stimuli; if it is functionally complete, any behavior controlled by one is henceforth controlled by the other. Predication, on the other hand, may be discussed as the imparting of information. When we say That type of mushroom is poison we effectively alter the listener's behavior by placing under the control of the mushroom all the behavior previously controlled by poisons. This may be verbal, as when he simply repeats what we have said, or practical and non-verbal, as when he simply avoids eating that type of mushroom or makes sure that

others avoid it also.

One autoclitic which must certainly be mentioned in any analysis of this sort is means. The layman uses the term almost entirely in the present sense. He says 'Slick' means 'slippery' and the effect upon the listener is precisely of the sort we have been considering. Hereafter all behavior with respect to slippery is also under the control of slick. (Whether the listener will be changed as a speaker and will respond to slick under the proper circumstances is another matter.) The layman also uses the term for purposes of predication: Faulty brakes mean trouble. The professional use of meaning derives from this case. It is primarily meaning for the listener and it is neatly expressed in a set of correspondences - not generally between words and things, though that case is a possible variation, but between verbal stimuli from one of which to the other it is safe to transfer a response. But the field of operation of a concept of meaning so defined is a small part of the total field of verbal behavior.

The dramatic behavior of the listener under hypnosis must be classified as an extreme case of the present process. If we hand the hypnotized subject a fly-swatter and say This is an umbrella, he transfers what we may call his umbrella-behavior to the fly-swatter. Our response is a sort of magnified definition. If we then say It is raining, he will transfer his rainy-day behavior to the present scene and perhaps hold up the fly-swatter as an umbrella. These statements are no more and no less an explanation of hypnosis than parallel statements are an explanation of verbal behavior. We classify the hypnotic instance in terms of the temporal and intensive relations among our variables. The initial hypnotic procedure which intensifies the verbal control to the practical exclusion of all other forms of stimulation needs further analysis, but the exceptional results under hypnosis are not different in kind. We can write a paradigm for the hypnotic case which differs from the normal only in the degree of motivation and of stimulus control achieved.

We are now able to make a distinction between the listener's response to a verbal stimulus which has occurred as a whole upon previous occasions, and his response to it for the first time. We have already accounted for the effectiveness of the verbal stimulus The telephone is out of order by noting that it has previously been correlated with no reinforcement of the response to the phone. But the component elements The telephone and out of order may have appeared only in other combinations. When the telephone is out of order for the first time, the appropriate response instructs the listener. The net result is the same: the listener does not pick up the phone. But in the novel case the response appropriate to out of order has just been transferred to the telephone. This may not be obvious. It is inferred from the history of the case, and the inference must be made to account for the origin of the behavior in the case of the novel pattern. It does not follow, of course, that the case must be novel to both speaker and listener at the same time. A response which is painfully composed by the speaker may prove to be a standard stimulus to which the listener reacts without instruction in the present sense. On the other hand, the merest cliché in the behavior of the speaker may profoundly instruct

the listener. This sometimes happens when the speaker is his own listener, as when we "suddenly see the significance of" a copybook maxim. Here an intraverbal chain of long standing - say, haste makes waste - is suddenly effective in inducing the listener who avoids waste to avoid haste also.

The general term instruction is particularly appropriate for this process because of its prevalence in educational institutions. We considered a special case of it in dealing with the behavior of the speaker. New verbal responses are always acquired from the behavior of someone else, except when they are invented, and hence they are part of the effect of verbal behavior upon the listener. In the cases considered the speaker came to emit a given response because he was the listener when a similar response was made by someone else under certain circumstances. Lectures, demonstrations, texts, and experiments all increase the verbal repertoire of the speaker through processes of this sort. But they also alter the behavior of the listener as listener. The student may learn to say poison in the presence of a given type of mushroom, or the picture or the name of such a mushroom, and so on. He will also, it is hoped, come to make non-verbal discriminative responses with respect to these stimuli. In both cases, the verbal behavior of the instructor, whether the instructor is a man or a book, has had an effect upon a listener. The proportion of verbal learning will depend upon the field. In the practical sciences the more important effect of instruction may be in establishing non-verbal modes of response, and of the verbal responses a large part will be facts. In history the effect is almost wholly verbal and the acquired behavior consists largely of intraverbal sequences.

The special process involved in instruction imposes a limit on the speed at which a verbal stimulus will be effective. When the stimulus as a whole evokes a well conditioned response, the only limit is a matter of clear phonetic patterning. A fairly long verbal stimulus - for example, the perfunctory recital of an oath - may be identified and responded to when emitted at high speed. But when the verbal stimulus is a novel arrangement of previously conditioned elements, emission must be much slower. This is especially true when the proportion of autoclitics is high, for in that case a great deal of instruction takes place. There are many different ways of investigating these matters. We may check the effectiveness of a long and rapid verbal stimulus by asking the listener to paraphrase it. Or we may ask him to follow long and rapid instructions in a given practical universe. Or we may ask him to report on the truth or falsity of a passage. Speed-of-reading tests measure the optimal speed at which comparable responses are possible, but in studying the rate of listening we generally present the verbal stimulus at a given speed and evaluate the listener's response. (It should be technically possible to permit the listener to vary the speed of an auditory presentation.) In any event, the effect of length of sample and speed varies with the sample itself and with the type of response studied. What is called "difficulty of a text" may be no more than the relative amount of novelty and consequently the relative proportion of genuine autoclitics. These will determine the amount of instruction which must take place. Semantic aphasia, as Head classi-

fied it, is a loss in the ability to respond in this manner. The logicians often construct verbal stimuli which contain confusing arrangements of autoclitics which lead to a sort of semantic aphasia in the normal listener. We respond to a fairly rapid Boston is in France by saying False. We respond to an only slightly less rapid "Boston is in France" is false by saying True. If possible, however, we may repeat it to ourselves at a slower rate before answering. But how quickly we respond is not what is meant here by speed of emission. We need a very slow rate to respond correctly to "'""'Boston is in France' is false" is true' is false" is true' is false" is true by saying True. The time we take to think it over is spent in generating the verbal stimulus again at a slower rate while emphasizing each of the autoclitics and the secondary responses true and false. This process is different from one which also requires time and which will be described next week.

We have surveyed four possible effects of a verbal stimulus: (1) The eliciting stimulus comes to control simple responses like salivating or blushing. (2) It may also set up a state of readiness to engage in more practical behavior in the field of emotion. (3) The discriminative stimulus serves as the occasion for practical behavior concerned with collateral and mainly non-verbal states of affairs, which must be present if the verbal response is to be effective. And (4) the reinforcing verbal stimulus alters the subsequent verbal or non-verbal behavior of the listener with respect to either verbal or non-verbal events. This classification follows directly from a non-verbal analysis of the functions of stimuli and can be shown to be exhaustive. Although a great deal of work needs to be done from this point of view, the data specified are all observable and adapted to experimental study. The effectiveness of the analysis can be seen by comparing two traditional concepts: "meaning" and "communication."

As we have seen, the concept of meaning is less confusing when it is used in connection with the behavior of the listener. Some sort of correspondence framework is at least plausible. But the precise usage needs to be qualified in each of our four cases and the significance of the term itself approaches the vanishing point as the supporting terms increase. Thus, when the verbal stimulus Dinner merely elicits salivation, its meaning would appear to be the dinners which have accompanied the term in the past, or some relation to those dinners. This is the purest case of stimulus substitution. If the response is emitted to energize the laggard, the meaning is roughly the same. When Dinner "means" that one may now sit down to table, the meaning is not sitting down, but the dinners which have been eaten in that position in the past or perhaps the dinner now to be eaten or some relation to such dinners. Here the correspondence grows weak. On the other hand, when someone says Dinner to the cook, the term "means" to the cook the reinforcing state of affairs which will cancel the implied threat in the speaker's behavior. In the case of instruction, if a savage puts a bowl of unappetizing material before a traveler and says Dinner the meaning to the traveler is the object which has previously been the rallying point for the response which must now be emitted with respect to the material in front of him. In every case we find that a dinner is involved somewhere, and that it can therefore be the

meaning of the stimulus Dinner or at least one term in a relation which may be called the meaning. But each case needs to be specified further and the dinners already appear among our variables as non-linguistic events. There seems to be no room for the concept itself.

Communication is no better off. Nothing is communicated in the sense of transmitted when someone says Dinner when[†] the listener can do nothing but drool. The speaker did not possess the moist mouth himself necessarily. Communication is somewhat more plausibly illustrated when the listener is able to go to dinner or to act in some other appropriate way. Here, at least, it seems as if the fact that dinner is ready is communicated. The fact is not the verbal response itself, for a dinner bell communicates the same fact non-phonetically. But if the fact is the state of affairs, in what sense is it communicated?

Consider the fact that there is gold in the Klondike. I may be said to know this non-verbally, if, when I need gold, I go to the Klondike. Perhaps common evidence of my knowledge is that I can say There is gold in the Klondike. This verbal response may have arisen from an act of composition on the spot in the Klondike, or echoically or textually from the behavior of someone else. It may be worth something, either to me or someone else, because it can produce an expedient change in the behavior of the listener who needs gold. When I tell someone that there is gold in the Klondike, I have altered his behavior with respect to the original conditions responsible for the verbal behavior. The fact that there is gold in the Klondike is nothing more than the original stimulating circumstance responsible for the coupling of the responses gold and Klondike. No "idea" of gold in the Klondike enters in. What is made common to both listener and speaker, to take the etymology of the term communicate, is either the verbal response or the non-verbal tendency to go to the Klondike when the gold drive is strong. Communication is therefore a metaphor and possibly a misleading one. The present analysis is more likely to represent the processes involved in the behavior of the listener in a more realistic way and hence more effectively in a scientific study.

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CHAPTER EIGHT: Understanding, Real and Spurious

We analyze the behavior of the listener by examining the various ways in which a verbal stimulus may be effective. The general lines of such an approach are suggested by a formulation of the non-verbal field. In the last lecture we examined four different functions of a stimulus: elicitation, discrimination, emotional disposition and reinforcement. These seem to exhaust the ways in which a verbal stimulus may be related to the behavior of a listener. But a special subdivision of one case, which is in many ways the most interesting and important effect of all was not discussed. A practical response to the behavior of the speaker as an occasion for successful action was illustrated by the case in which Dinner is ready evoked the non-verbal act of sitting down to the table. A verbal act - say, the response Good! I'll call the others - fits into the same paradigm. A special case arises when the listener's response is not only verbal, but echoic or textual. The case is trivial when this is its only characteristic, but when the echoic or textual response supplements behavior which already exists in some strength in the repertoire of the listener, an extremely important condition arises.

The multiple causation which is involved might have been appropriately considered in the fifth lecture, for no new process is involved. But the case requires special treatment, under the general heading of the behavior of the listener, when certain variables affect both the speaker and the listener. When they are both, so to speak, in possession of the same facts, nothing is communicated. The echoic or textual stimulus has a significant effect only when, through a supplementary contribution, it evokes behavior which already exists in some strength. The same verbal response is already part of the repertoire of the listener, and is emitted upon the same occasion. But with certain limits to be noted in a moment, the effect is often more important to the listener than any new occasion for action or the acquisition of any new information. We might describe a case of this sort by saying that the speaker "makes something clear" to the listener, or "gets him to see a point," or helps him "understand" a given state of affairs. In more technical terms we should have to say that the speaker "gets the listener to react verbally in a certain way." In any event he does not report on something which he alone sees; he gets the listener to "see something his way."

Written behavior is especially likely to have a supplementary effect of this sort, and when the reader is not explicitly mentioned in what follows the term "speaker" should be taken to include him. However, the textual and echoic cases are not quite similar. Vocal behavior comes first in the history of most speakers, and the behavior of the reader generally passes through a vocal or subvocal stage. The textual response discussed in an earlier lecture was limited to a vocal response under the control of a text as a stimulus, and the other activities of the reader were explicitly excluded. But the reader, like the listener, is a receiver of speech, and our previous description of the listener applies to him throughout. Thus a text as a stimulus may evoke a conditioned response of the Pavlovian variety, or it may serve as the occasion for successful accompanies or gives rise to that effect. The textual response can often be distinguished: A-mer-i-can -

oh, yes, American. But the text itself is in a temporal position which eventually makes it a conditioned eliciting or discriminative stimulus apart from any textual response. The latter may drop out altogether, especially in the rapid reader. A barber pole and a sign reading BARBER control the behavior of someone who needs a haircut in the same way. Any response to the printed sign - saying barber - is a collateral and perhaps irrelevant event, so far as the other effect upon the reader is concerned.

In the important effect now to be discussed, however, the reader must make a textual response, and in the comparable case of listening an echoic response must be made. Since the effect is fairly subtle and, so to speak, highbrow, this requirement may be surprising or puzzling. It is not at first clear why scientific or philosophical discourse should depend upon the apparently mechanical behavior of the echoic or textual response. But this is an excellent illustration of the ultimate value of a comprehensive study, which is not limited by preconceptions of significance. We are able to deal with an elusive intellectual process in relatively substantial terms. We do this by bringing into action almost every feature of the analysis up to this point, and it then appears that the key to perhaps the most difficult verbal problem is the notion of multiple variation in which an echoic or textual contribution is critical.

It is easy to demonstrate that the listener is often saying what the speaker is saying at approximately the same time. He can supply a missing response when the speaker's behavior is obscured by a sudden noise or a short break in a telephone circuit, or when a small piece is torn from a page. He frequently completes a sentence for the speaker if his own behavior is more rapid or if the speaker is for any reason delayed. He may join in with the speaker on an important word or phrase. He recognizes his own participation even when he does not emit a response by saying "He took the words right out of my mouth."

In such a case there can be little difference in strength between the speaker's and the listener's behavior. The speaker's behavior may be slightly stronger for many reasons. The listener may not have been so thoroughly conditioned, or he may have to some extent forgotten. His motivational level may be lower. The contribution from supplementary variables may be less. He may not make discriminations of the same subtlety, and the background responsible for a metaphorical extension may be less advantageous. And so on.

A trivial example of the resulting process is illustrated by the speaker who supplies the name of an animal at the zoo which the listener has partially forgotten. The example differs in no important respect, so far as process is concerned, from a discussion of, say, the European situation, where the speaker's response may be the result of a very complex set of variables. Roughly the same set has also been effective upon the listener but has not produced the strength needed for independent emission. In making a metaphorical extension the listener may be slower, but some tendency to respond in a similar way is indicated if he "sees" that the metaphor is apt. If he does not, the present case does not arise. Where the vari-

ables are principally intraverbal, the listener is also assumed to have each response in some state of readiness. For example, when two people are working out a problem in algebra together one may make the effective response first, but if the present case holds, the other must also have progressed toward the solution. He makes the response, not only as an echoic response, but for additional good and nearly sufficient reasons. In reading a text the intraverbal sources arising from the preceding parts are close to those which affected the writer.

The result is not unlike that of the verbal summator. The speaker's behavior may be thought of as an optimal summing pattern, which matches the behavior of the listener in every detail. Because the match is good, the summing stimulus is generally presented only once, though we shall see that many repetitions are required sometimes before the listener "gets the point." The speaker and listener do not, of course, emit responses simultaneously. The time required for the echoic response may be of the order of a fraction of a second, but the reader may respond to the verbal behavior of the writer after a thousand years. The speaker and listener are responding at approximately the same time because of the temporal characteristics of the echoic response. The important datum is that both the echoic and the textual response supplement behavior which is already strong and appears with it in a single emission of the response. There is a single verbal act on the part of the listener or reader. It is generally sub-audible and hence difficult to examine. But the special contribution of the present analysis is that we are able to talk about partial contributions of strength meaningfully enough to give a plausible account of what is happening.

It is not the principle of multiple causation alone which raises the question at issue. The same process may take place when the variables which affect the speaker and listener are not the same. To put it roughly, the listener is then "saying something else with the same words."

As Lord Jim was being led away from the scene of his trial, he overheard someone saying Look at that wretched cur. The speaker was responding to a dog wandering in the crowd, but Lord Jim took it as a reference to himself. He did not see the dog, and hence did not possess the response under that control, but similar behavior with respect to himself was currently strong for other reasons. The general name for this, in more exalted discourse is "eisegesis." An excellent example, quoted by Ogden and Richards, is due to Lyman Abbott.

Jesus did not say "Lay not up for yourselves treasures upon earth." He said "Lay not up for yourselves treasures upon earth where moth and dust doth corrupt and where thieves break through and steal." And no sensible American does. Moth and dust do not get at Mr. Rockefeller's oil wells, and thieves do not often break through and steal a railway. What Jesus condemned was hoarding wealth.

A sort of fragmentary eisegesis is responsible for the difficulty of the reader who starts to say something else with the first words of a passage but finds the balance not adapted to what he has begun. He misconstrues the beginning of a sentence

and is helpless when he tries to continue saying what he has begun while also following the text. Misreading and mishearing are also cases where the process goes awry. Here the response made by the listener is usually slightly distorted from the strict echoic or textual response. The folk etymology is produced in this way. The echoic response to asparagus succeeds in strengthening only the response sparrow grass, which has a greater resting strength as a standard form. Other examples of the same process are more revealing, in the Freudian sense, because the variables responsible for the distortion are more important. The unhappy fate of a gallant young man who had done more than his share of dancing with a chaperone is an example. As the chaperone broke off in the middle of a dance and led the young man off the floor, she exclaimed I'm just too danced out, whereupon the young man protested I don't think you are too damn stout at all!

The extreme case of different controlling variables is what George Moore called echo-augury - "words heard in an unexpected quarter, but applying marvelously well to the besetting difficulty of the moment." Here the simultaneous state of strength in speaker and listener is due to chance, and, as is always the case with chance, the listener may be especially impressed and even act upon the response with a special belief.

When the same variables are involved - when the speaker and listener are saying approximately the same thing - there is a special effect upon the listener. The speaker could be said to be helping him to respond. It is like showing someone how to open a package or operate a machine, not as a complete act of instruction but by supplying a hint. This can be of great importance, and we value the result accordingly. We also find it pleasurable and possibly for the same reason.

Thus, we clearly do not enjoy hearing someone say what we ourselves have also tended to say in full strength. If a lecturer says what we have been "saying all along," we are not helped nor are we pleased. Obvious remarks are neither useful nor delightful, nor are heavy doses of clichés, well-known stories and so on. We could have said the same thing ourselves, and did not only because an occasion was lacking. We find useful and enjoy behaving which matches strong behavior of our own only when we have been prevented from speaking. If we have a severe sore throat, or are not in a position to be heard, or are not eligible to speak, we may be delighted to hear someone say what we have been futilely muttering to ourselves, and in many ways his remark will be as useful to us as our own would have been. We are also restrained in a similar way by the punishments we have received, as a technical formulation of the effect of punishment will show. As a result we may enjoy the fact that someone else emits a vulgar or obscene remark or a vicious reply to our antagonist. But these are exceptional cases and the general rule stands that we do not use or enjoy verbal behavior which matches behavior which is already in strength.

At the other extreme we cannot use and do not like behavior which has no appreciable parallel in our own repertoire. The discussion of an obscure detail, an account of a wholly unfamiliar subject, vague literary allusions, farfetched metaphors,

intraverbal sequences which do not correspond with the contiguous usage of our own experience, not to mention wholly unfamiliar verbal forms, are both worthless and dull. To some responses of this sort the listener may say I don't get it, meaning I don't find myself saying anything like that. To others he may simply make no response whatsoever. And he does not go back for more.

There is still a fairly wide range between these extremes where the speaker is of considerable help and therefore sought after. We are especially attracted by writers who say what we are almost ready to say ourselves, and by speakers who take their words off the tip of our tongue. With surprising accuracy we call such writers or speakers "stimulating." This does not mean that they make our mouth water or send us off on some practical errand. They make us think; in our present terms, they make us behave verbally. The sense of agreement which follows is a powerful social force, which can be exploited for ulterior purposes, as we shall see later. We also find useful though somewhat less delightful the verbal response which we are not well along toward emitting. We have been puzzling over a given complex situation, for example, and someone suddenly makes a remark which is clearly appropriate. We make the remark, with the aid of this supplementation, almost as if we had arrived at the same conclusion ourselves. (This is not instruction, as that term was used last week, for the final response on the part of the listener is changed in strength only, not in the kind of control.) The good metaphor may not be on the listener's tongue but it is immediately accepted because considerable sources of strength have been active. With exceptional modesty we may refuse credit for the effect of the metaphor or exclaim Why didn't I think of that? But if it was an effective metaphor we must have "thought of it" to some extent. A merely echoic response is not valuable or delightful. A collateral source of strength must be present.

The goodness of match between the behaviors of speaker and listener will be determined by many conditions. It will be greatest if they speak not only the same language, but the same sub-language. Slight differences in preferred forms will interfere with the summative effect, even though the listener may react perfectly well according to the paradigms examined last week. The same autoclitic practices are important; we react optimally when the arrangement of parts and the grammatical tags resemble our own intraverbal tendencies. Broken English which serves well enough the other functions of verbal stimuli may fail to supplement the behavior of the listener in an effective way. The same experience in listener and speaker will to a large extent determine a common vocabulary, not only at the level of the word but in the larger, but functionally unitary, responses which "say something." The same drives - and the same attitudes and interests - are important. And when the stimuli are vocal, the same speed of utterance is an important characteristic. We fall behind a fast speaker, and grow impatient with a slow one - a fact which raises a special problem for the stutterer.

With respect to a given population it is possible to speak meaningfully of the universality of a literary work. This is too big a subject to be dealt with adequately here, but several points may be noted. Readers look for and follow writers

who say what they want to say - whose work matches responses which they themselves possess in some strength. The writer who seeks universality will try to match strong latent verbal behaviors. Conversely, we may argue from the success of a book, that there are large numbers of people who possess a certain kind of verbal behavior in strength. Thus, during a depression, many people will sing a popular song which permits them to repeat Who's afraid of the big bad wolf? And when a world-wide war is threatening, a stubbornly pacifist people will want to read of a bull who refused to fight and to join with the author in an emphatic Not Ferdinand! The thematic interpretation of literature follows this general pattern.

Professor Allport has pointed out that autobiographies are especially interesting because they satisfy the reader's own self-love. We could say that most people possess strong behavior with respect to themselves as a subject matter, and that an autobiography or a novel written in the first person will supply the appropriate supplementation.

It is easy to show how ambiguity, in Empson's sense, increases the chances of a successful match. If at least two sets of variables are responsible for the behavior of the writer, the reader is more likely to have at least one set in common. This is one source of value to the reader of the multiple processes which we have already reviewed with respect to the writer.

The speaker or writer may act upon the listener to increase the likelihood of later successful matches. A novel of character achieves its principle effect by carefully preparing the reader to join in with the verbal remarks of the characters. When we read a description of a non-verbal event, or a mere summary of verbal behavior, our verbal behavior is not supplemented according to the present formula in any important way. But when we read "conversation" the textual response makes supplementation practically inevitable. That is why novels with "lots of conversation" are so popular. The great character writer prepares the reader in such a way that a given remark seems not only very probable, but at times absolutely inevitable. The conditions for a good match are almost ideal. A similar effect is seen in the theatre, where the spectator is first prepared for the responses which are later strengthened echoically.

The discovery of progressively more effective literary forms has been in one sense a blind process. The writer is frequently his own best reader, and he may discover how to prepare the reader for supplementary processes by checking them in himself. He may create a character whose verbal behavior is wonderfully consistent and effective without understanding the present process at all. But building verbal behavior of a given sort is often recognized as an explicit goal. This is what is meant by getting agreement. When a listener "agrees" or "concurs" he may take various practical steps which are important to the speaker, but first of all he must "say the same thing." I agree is an autoclitic which can generally be translated I also say. The same goal may be thought of as creating or strengthening or changing an "opinion," which is a verbal response of groups of such responses with a special deficiency in the controlling states of affairs. As the autoclitic In my opinion shows, responses of this sort are

qualified. We may also be said to strengthen or weaken a "belief," which we have already seen to be definable in terms of verbal behavior. When the behavior of the listener becomes an explicit goal, the value to the listener may decline. The effect may become especially important to the speaker. But on the surface at least the object is assumed to be to get the listener to respond in an adequate and suitable way.

The speaker reveals his basic interest when he emits the simple mand Say it yourself followed by the particular verbal response which he wishes to strengthen. He may later check on his progress by asking Don't you think so? or Wouldn't you say? He may try to create a spurious sense of strength with frequent responses like of course or naturally. If these are echoed by the listener, they will go far toward concealing the fact that a given response is almost wholly echoic and hence not a matter of course or natural at all. The speaker may also resort to standard devices, for which classical rhetoric invented scores of names, which submit quite easily to an analysis in the present terms.

One of the commonest of these is simple repetition. As the verbal summator shows, a repeated stimulus may eventually be effective even if its summing power originally is slight. But since simple repetition may have undesirable collateral effects, the rhetorically minded speaker is forced to repeat in disguise, as it were. Fragments of the required response - especially certain key words - are worked into other sentences. Classical rhetoric had names for many devices of this sort. Simple repetition was called epexergasia; repetition of a word or clause after other matter was called epanalepsis; repetition at the end of successive clauses was called epiphora or epistrophe; a double repetition at the beginning and end of successive clauses was called symploce; the repetition of autoclitics was called hypozeuxis; the repetition of a word with a different autoclitic frame was called polyptoton; and so on. Many of these devices achieve a more localized effect to be noted in a moment but they were clearly understood to be useful in building the assent of the listener - that is to say, building behavior in the listener's repertoire to match the speaker's statement. We may note in passing that little of this is useful. The echoic or textual supplement prepares the listener to "say the same thing" but not for good and sufficient reason.

The variables involving the tact and intraverbal response can be used with more justification. When the speaker engenders appropriate behavior by emphasizing important aspects of a situation, or when he rearranges various features to yield more clear cut autoclitics of assertion or predication, he may be strengthening useful behavior. The listener may eventually agree for good reason. The commoner case in which the speaker builds intraverbal preparation - by reviewing data, describing cases, and so on - is also justifiable in this sense. A venerable example is the fable or parable, where a story is told in order to build a strong predisposition to join with the speaker when the moral is reached. But these "thematic" preparations can also be spurious, as in various techniques of propaganda, where an agreement with a final proposition is rendered more likely with wholly irrelevant thematic materials.

The speaker may also be interested in weakening a re-

sponse. The commonest method is, so to speak, to "dump" the listener's verbal behavior by making the response for him. This is most effective if the speaker adopts the same verbal characteristics in what classical rhetoric called schesis. By anticipating objections (prolepsis) or answering imaginary objection (anthypophora), the speaker reduces the tendency of the listener to emit these responses himself. The speaker does not go on to use the behavior thus affected in any instance of supplementary evocation, and the present point is not at issue. But the weakening of the behavior of the listener is an effect which needs to be listed, and which cannot, of course, be classified with the processes discussed last week.

In gauging the effective range of verbal supplementation it was possible to show that the extent to which the listener enjoys a verbal stimulus is a function of its usefulness. But it is clear that the process of supplementary evocation is pleasurable apart from its usefulness. The delight which one takes in a good style is a case in point. A more conspicuous effect is the delight which one takes in verbal play, and we shall see shortly that it is made of the same stuff. In any case we have now to examine instances in which fragmentary responses are prepared by the speaker not because they are useful to either speaker or listener but apparently for the sake of supplementation itself. We may avoid the question of how one measures delight by dealing only with the listener's tendency to get more of the same. The following processes characterize verbal stimuli which lead the listener to continue to listen.

The effect is most easily demonstrated in the four poetic devices of rhyme, rhythm, alliteration, and assonance. We have seen that they exemplify multiple variation in the behavior of the poet, but we have still to discover their effect upon the listener or reader. This can be formulated as fragmentary strengthening through echoic or textual responses. The second pair of rhyming words, for example, is somewhat stronger when the reader comes to it because of the echoic contribution from the first member. In the couplet

And other strains of woe which now seem woe
Compared with loss of thee will not seem so

the textual or echoic response so combines with the echoic fragment's from the preceding woe. So is therefore not only thematically determined by the preceding will not seem, it is also formally determined. This can be demonstrated very neatly by asking people to complete couplets from which the last word has been omitted with and without the preceding line. (The general agreement can, in fact, be used to gauge the caliber of the poet. Couplets from Edgar Guest will be completed with almost no trouble. An obscure poet, especially a poet whose vocabulary is dated or who appeals to a literary tradition which is no longer in force, will get little agreement. In the good poet a moderate preparation is provided.)

The echoic contribution from the first of a pair of rhymes would be effective regardless of the position of the second member. The "rhyme scheme" is a non-phonetic intraverbal device which heightens the effect. The inveterate poetry reader develops a temporal discrimination which makes the echoic con-

tribution most effective at a particular point. The specialist in Alexander Pope, for example, gets an effect from a rhymed couplet which is lacking in the novice who reads Pope for the first time. The verbal repertoire of the specialist contains a set of skeletal lines with characteristic last syllables. It is roughly the same intraverbal repertoire which makes it possible for skilled persons to produce rhymed couplets with great speed.

In alliteration and assonance the first of a pair of similar sounds contributes some strength to the corresponding word which follows. When the second instance is reached, the reader is prepared to say it to some extent "on his own." The advance strengthening due to rhythm exemplifies a rather vague non-phonetic unit. The summative effect (which we may assume to be proportional to the formal similarity and also to the degree of unusualness of the property involved) is slight. A stress pattern does not predispose the reader to make any one response in any great degree of strength. Unlike the summing effect of rhyme, alliteration, and assonance, the rhythmic stimulus must be repeated, as in the verbal summator. One instance of the stress pattern does little toward strengthening the responses with similar patterns. But several repetitions - - may establish so strong a tendency that a response which does not match the pattern is quite unlikely. Alliteration, assonance, and rhyme are also improved by repetition but do not need it.

The parallel case of thematic preparation is obvious. It is the reader's side of multiple meaning. The interlocking of variables in the behavior of the writer means that additional sources of strength are available for the reader with similar verbal behavior. The parallel with the formal supplementation of the textual response must be drawn carefully. The second of a pair of rhyming words takes its first measure of strength from the thematic material which precedes it. It is, we say, an appropriate response, which makes sense. A textual fragment is added from the first rhyming response. When the reader actually reads the second rhyming response, three variables contribute to his behavior. In the case of a response with multiple intraverbal connections, the primary source may also be thematic; the response is part of a larger pattern of more or less standard form. The second thematic source depends upon the relation of the multiple variables in the behavior of the writer. In the line

The tiger springs in the new year

the preparation for new year, which follows from an intraverbal response to spring is added to the thematic preparation from the whole passage. The textual response at the moment the poem is read is a third source. But not all responses showing multiple variation prepare the reader in advance. Thus, the response cut this knot intricate may be strong in the reader for the same reason it was strong in Shakespeare. Separate sources of the blending forms intricate and intrinsic may be discovered in the text. But the resulting behavior is not build up step by step in a fashion which parallels the case of the formal devices of poetry. The latter is better exemplified by a writer like James Joyce, who builds thematic predispositions as a poet builds formal predispositions. The thematic analyses of Ulysses and Finnegans Wake reveal the text to which multiple thematic sources entered into the behavior of the writer. These works also reveal the weakness of thematic play. The required intra-

verbal sources depend upon similar verbal history in writer and reader, and these may be lacking. But the poet can count on an echoic or textual repertoire in every reader.

The formal preparation of the listener or reader bears upon a problem of long standing in literary criticism. It has been assumed, in line with the traditional conception of verbal behavior, that there are two principal elements in a literary work - its form and its meaning. Some works, particularly poems, seem to be enjoyable because of their form. They are nice noises, and they can be enjoyed in this sense by one who does not know the language. Literary works are also enjoyable because of their meanings; they describe things which are pleasant or interesting. But there is obviously something more in good writing, something not far from wit or verbal play. The only possible explanation has seemed to be that there is a subtle connection between form and meaning.[†] A great deal of nonsense has been written from this point of view about suiting the sound to the sense. It is a good example of the hampering limitations of the traditional conception. A study of the way in which the reader's behavior is prepared and released by a text is a rewarding alternative, although there is not time to discuss it further here.

The process is clearly involved in what is called style. The style which is the man need not detain us; everyone has idiosyncrasies of verbal behavior which are more or less useful and delightful to others. The style which, according to Pater, is "a certain absolute and unique manner of expressing a thing, in all its intensity and color" represents an attempt to deal with the problem as a matter of successful expression. But when we try to pin down the "thing" in order to see how well it is expressed, we run into all the old problems. It is clearly not a thing, or any success in expressing a thing, which is effective on the reader. Various "expressions" will be more or less confusing, more or less difficult, and so on, and we may choose between styles on that basis. But most of the ways in which the stylist works upon the reader are to be classified as instances of the present process. The writer plays cat and mouse with the verbal strength of the reader - building it up, allowing it to fall away, exhausting it suddenly with an apt remark, holding it in abeyance in a periodic sentence, and so on. The "happy phrase" is not one which expresses a thing well (the reader may have no independent evidence of the thing); it is a phrase which is exactly suited to present verbal tendencies in the reader. If these are due to the same thing, so much the better; but other reasons for the match are commoner. Le mot juste is not the word which best describes something apart from the context; it is the word for which we are optimally prepared by all that precedes it. The preparation is largely a matter of intraverbal frequencies, which build a disposition to respond which reaches a critical value just as the word is reached. That is why timing is so important in style, why we lose the thread when we are interrupted, and why we cannot begin in the middle of a paragraph and get the effect of the style even though the content is perfectly clear. None of these matters can be successfully explained with any variation of the theme that the writer is in some subtle way suiting the sounds to the sense.

There are stylistic devices on a larger scale which build up verbal strength but never provide the supplementing form.

The writer, as a matter of fact, may say the opposite. Or he may let the reader emit the response entirely on his own. This is in fact, his only solution if he has over-prepared his case and built up a response past the point where it will be useful or delightful. Standard phrases are frequently clipped. The complete response would find the reader too well prepared. We may say a word to the wise but omit the is sufficient which has too much strength because of increasing intraverbal support. The reader is assumed to have the answer to a rhetorical question in full strength and if the writer also emits it he kills the effect. In allusion, innuendo, insinuation, and implication, the strength is also raised to a point at which the response may safely be left to the reader. Other manipulations of verbal strength are similar to the hint and the prompt discussed in a previous lecture. In the classical process of aposiopesis a sentence is begun, continued to the point at which the listener can take over, and then discontinued. This has the same effect as paraleipsis, for the writer may pretend to be unwilling to discuss the matter. The surprise ending of the type of short story associated with the name of de Maupassant gets its effect by strengthening a response which must be emitted unaided by the reader if at all. "The jewels were false? Why, then the poor woman was paying for a replacement all those years for nothing!" Another way to induce behavior in the reader is to qualify our own response unnecessarily. In understatement (meiosis) a powerful corrective response is stimulated. Negative irony and sarcasm, or simply the inverted speech exemplified by a pretty fix or a nice state of affairs, generate contrary behavior in the listener.

These feats of strength cannot be accounted for with traditional schemes built upon the notions of meaning and communication. They are also not explained by the usefulness of the effect upon the listener. The manipulation of the latent verbal strength and the supplementary evocation which follows are important in their own right. It is a sort of verbal play, which reinforces the listener (so that he continues to listen) and hence, in turn, the behavior of the speaker. This is more clearly shown in that part of the field of verbal play called wit. The delight which we take in a clever style is hard to identify, but laughs can be counted and even, as in a radio studio, in decibels, and hence the effect of the witty remark can be more closely followed. And it is worth noting that each of the literary effects already described has a parallel in the field of humor.

There are many reasons why men laugh, and they do not all apply here. Even in the verbal field, some behavior may be laughable merely because it is clumsy, awkward or otherwise amusing in character, or because it describes an amusing episode. All such cases fall within the paradigms discussed last week. There is nothing peculiarly verbal about them. But wit, as a form of verbal play, is still unaccounted for. This "effect upon the listener" involves his latent verbal behavior. The supplementary evocation of a very feeble response, for example, is generally funny. The original controlling variable may be vague, the metaphorical or generic relation far-fetched, or the intraverbal sequence unusual. The dentist who in repairing his car took a firm grip on a spark plug with a pair of pliers and then said Now this is going to hurt a little is a case in point. A trivial feature of the stimulating situation is responsible for this ex-

tension and for the matching response evoked in the listener. It is not essential that a funny remark be illogical; many examples simply show weakness. Unfortunately the best cases of this sort are so subtle that they cannot be successfully reconstructed. When a friend and I were walking along Massachusetts Avenue a number of years ago, a street car squeaked to a stop near us. My friend immediately whistled a phrase which, following upon the squeak of the car, comprised the two opening bars of Bach's Toccata and Fugue in D Minor, but it is impossible to recapture the amusement which this generated. Upon another occasion the same friend, hearing a Pops orchestra play the onomatopoetic selection called The Flight of the Bumble Bee began to brush imaginary bees away from his head. These examples are on the fringe of the verbal field. (They are not, of course, linguistic at all.) But they exemplify the emission of a very feeble response, and without[†] the supplementary evocation of a similar response which was otherwise too weak to appear in the listener's behavior, the result would not have been funny.

Humor is an almost inevitable by-product of multiple causation. Most of the examples used in my fifth lecture help to enliven an otherwise dull afternoon. The pun is funny or not according to fashion, but many other cases are generally amusing. Rhyme is ordinarily not funny, but if it is far-fetched it may be. Polysyllabic rhymes are likely to be far-fetched in this sense. And when the rhyming contribution produces the type of distortion associated with Ogden Nash, the effect is invariably funny. Distortions are funny usually regardless of the contributing sources as in New England spoiled dinner or spewed prunes. In 1936 when Roosevelt carried all but two states, several writers independently said As Maine goes, so goes Vermont, which was amusing to about 50% of the electorate. And when John L. Lewis was trying to organize the farmers, I woke one morning singing softly to myself, Old McDonald had a farm, C-I-C-I-O. The other tricks of strength used by the serious writer are paralleled by verbal devices. A delay in reaching a strong response, as in the prolonged last line of a limerick, produces an excitement which is close to humor, and innuendo, understatement, and dumping the behavior of the listener with a surprise remark are familiar techniques.

Why these are funny is another matter. As Max Eastman has pointed out in his Enjoyment of Laughter, it is important to distinguish between the technique of wit and the bonus which may accompany it. By avoiding taboos of one sort or another some manipulations of strength have an added effect, but this is not wit itself. Eastman's theory of why a remark is funny is that it always involves a sudden change in the direction in which the listener is moving - a derailment, so to speak. But this will not take care of all instances. Freud's appeal to the economy of using a single word for two functions seems to imply that economy is altogether more laughable than most of us find it. Dr. Johnson's theory of surprise is still about as good as any, whatever the nature of the effect itself. Here we may rest content with the observation that it is produced by a manipulation of latent verbal behavior, that it is therefore closely akin to the literary effect previously discussed[†], and that it cannot be embraced by the kinds of reaction of the listener discussed last week.

[Page 142 and all but the last line of Page 143 of Skinner's manuscript were, according to his list of errata, out of place. In this document, these passages have been inserted in their proper place after the first paragraph on page 159. To preserve fidelity with the pagination of the original manuscript, the page numbers of that document are being preserved here. Thus this page and most of Page 143 remain blank, and the document resumes on Page 144. Two new pages, 159A and 159B, have been inserted in this document to serve the same purpose. -Ed.]

It is rather late to be reaching the announced topic of†

this lecture - Understanding, Real and Spurious. But we have not been too far afield. What actually happens when we understand something - when we eventually come to understand something? Theorists of meaning have attempted many answers, of which the following is a fair sample - we understand a remark when we know its truth conditions. This must be an empirical statement, for understanding is not a logical process. But if we review the effects which a verbal stimulus may have upon the listener, step by step, we see how deficient it is as an empirical description. In the Pavlovian conditioned reflex - when, for example, we blush at the mention of a bad break - we understand what was said to the extent that we react. An unknown language does not affect us in this way except through formal overlap. A verbal stimulus which is the occasion for successful action is understood in much the same way; we understand to the extent that we tend to act. Other conditions needed for the response may be lacking,[†] but we are in a position to handle a tendency to act without regard to them. In the case of what we called instruction, we understand to the extent that we undergo an appropriate change in behavior. All of these cases illustrate understanding in the sense in which we understand English. We respond according to our previous exposure to certain contingencies in a verbal environment. If we have not been so exposed we cannot so respond. There is no other need for a term like understanding in such cases.

But this does not account for the common case in which we understand or come to understand a remark about something which is familiar to us. The best examples are in the field of scientific and philosophical discourse. Suppose we start to read a fairly difficult paper, and[†] suppose that we can respond correctly to all the words it contains, so far as dictionary meanings go. We may also assume that we are familiar with what is being talked about. We may still not understand the paper. We might not "get it," might not "see what the writer is driving at," might not see why he says what he says at all. The basic fact is that we ourselves might not respond in the same way. The paper does not supplement verbal behavior which exists in any considerable strength. We possess each of the responses in the sense that it is part of our repertoire but we do not tend to emit it at the time indicated by the text.

Suppose, now, that we go over the paper again, as we must if we are ever to understand it. What processes will explain any change that may take place? The intraverbal sequences established during the first reading will, of course, leave an effect. It is now familiar; to some extent we do tend to say the same thing ourselves. The end result of this process alone would be that we should completely memorize the paper. But that this is not enough is clear from the fact that we might still not understand it, though we should probably feel that we understood it to some extent. Other processes must go on if we are ever to get the point. One of these may be instruction, in the special sense already defined. Some sentences in the paper will equate responses in a sort of definition, and the resulting change in our behavior will be felt when these responses occur elsewhere in the text. Other sentences, through predication, will produce other transfers of response. Our behavior will therefore actually be altered on subsequent readings, and in the direction of an increased understanding. Our usage will be

closer to the writer's.

But there will also be an effect similar to that of the verbal summator. The process is exemplified when we are trying to decipher bad handwriting or a poorly recorded verbal stimulus. Our only recourse is to reread or relisten until a plausible response appears. Then we understand the text or the record to the extent that we make a suitable textual or echoic response. The unit is not the basic unit repertoire in these cases. This is of the same order of importance as understanding English. But larger patterns may increase their strength in the same way. Slight non-echoic or non-textual tendencies to respond will be strengthened through repetition, until the responses can be made "on their own." Something of this sort happens when we hear a subtle metaphor many times before seeing that it is apt. This is perhaps the principal result of rereading. We come to make the responses which the text makes and to make them for good reason. The reason may already have existed in our own behavior, but without being very effective. We come to understand a passage by coming to emit the same behavior on our own.

This accords well with the layman's use of the word. We understand anything which we ourselves can say with respect to the same state of affairs. We do not understand what we can not say ourselves. We misunderstand when we say something else with the same words - that is, when we emit the behavior because of the operation of different variables.

Our report of our understanding will require secondary behavior of the sort discussed two weeks ago. I understand, or the more casual, I see, is an autoclitic concerned with the independent strength of a verbal response. But the exact conditions are not easily specified. I see is not a matter of strength like I am sure or I know, nor is it primarily a matter of a correspondence with the behavior of someone else like I agree. It calls for a distinction among the variables responsible for behavior, and this may be very difficult. How do we know which variables are effective? Can we be sure that we have not "understood" because spurious techniques of rhetoric or style have build predispositions to respond through various irrelevant devices?

The answer would seem to be that we can never be sure that we fully understand anything. As we read and reread a paper or discuss a given subject with ourselves or someone else again and again, certain responses gain power. They do this because the net effect of the repeated variables is to give them a preeminent position in our behavior. They may also grow strong because they lead to other kinds of expedient behavior. The eventual test of a useful verbal response is its usefulness; there is no other appeal. But that such a response is the only true or valid or possible response under a given set of circumstances does not follow from this usefulness.

A large part of verbal behavior, then, has for its principal effect the strengthening of corresponding behavior in the listener. It is not the creation of new behavior, as in instruction, nor is it the imparting of information by a speaker who is in a special point of vantage. It clarifies and strengthens behavior which

has already been available in some degree. This is often for the benefit of the listener, sometimes of the speaker. When the speaker is talking to himself it is for the benefit of both. According to traditional conceptions of language, talking to oneself must be idle if not actually pathological, since nothing can be usefully communicated to oneself. But the verbal behavior inside a single skin is perhaps the most important of all, and there could scarcely be a better demonstration of the importance of the special effect upon the listener just reviewed. The full extent of this effect can only be appreciated when we have considered some of the special achievements of verbal behavior in the field of thought. That topic and a final survey of the contribution which verbal behavior makes to human affairs will be the subjects of the two lectures which remain.

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CHAPTER NINE: Thinking in Words

The response I think usually accompanies verbal behavior which is weak. When we say I think that he is right, the listener acts with less assurance than if we had said That is right. Part of the effect of any verbal response can be cancelled by adding the tag: I think. This is a secondary response to prior behavior of another sort. It may be an immediate qualifier of a single instance of primary behavior, which the listener finds useful in gauging the reliability of the instance. It is then an autoclitic, as that term was defined in an earlier lecture. Otherwise, it is merely a description or report of behavior equivalent to I find myself saying. I think may also accompany a report of behavior which has not previously been overtly emitted. In saying I think he is being very silly, the speaker indicates that the response He is being very silly is in a sufficient state of strength but that the circumstances are unfavorable for emission with respect to another audience. In both instances I think is partly under the control of events which are private to the speaker himself. Some indication of the strength of a response is effected in the first case and what is generally known as "covert behavior" in the second. It has already been necessary to mention this problem in connection with the making of sentences. The editing and manipulation of verbal behavior sustained suggests that the speaker is affected by the precursors of emitted speech and that he can respond to its state of strength and identify its controlling variables. But the problem has a wider range.

The notion of a covert behavior, particularly the hypothesis that thought is merely subaudible speech, has played an important role in behavioristic writing for the past thirty-five years. It has not been a very productive notion. Some progress is made in identifying the covert event as behavior, but it has proved to be as inaccessible as any other private process, and we are little better prepared to study thought than we ever were. We might dismiss the matter here by arguing that covert verbal responses are not properly part of our field. Anyone who wishes to do so may extend the analysis to his own subaudible behavior, but we are under no compulsion to this in a scientific study. But there are certain embarrassing gaps in our description. In intraverbal chaining, for example, necessary steps may be missing from overt observations. When we ask someone to solve a problem in "mental arithmetic" the relation between our statement of the problem and his answer can be expressed only with the aid of inferred subaudible events. Moreover, we have to account for verbal behavior which is under the control of subaudible speech as part of the stimulating environment - the so-called "reports" of covert events.

What, then, is subaudible behavior like, and how can we deal with it? A fairly plausible view is that it is like overt behavior except that it takes place on a smaller scale. If we recite the alphabet by voicing and whispering alternate letters, it is easy to identify the component which makes the difference: A-b-C-d-E-f-G-h ... If we whisper every other letter while saying the remaining letters silently, we can observe the difference between overt and covert behavior: A-()-C-()-E-()-G ... It seems to be largely a matter of the extent to which the response is execu-

ted. There is little change in the time required or in the supporting behavior of the rest of the body. The muscular involvement in silent speech of this sort has, of course, been demonstrated instrumentally. It is also shown when another response competes for the same muscles. A standard demonstration is to try to "think" bubble, bubble, while holding the mouth wide open. But many people find it possible to do this, especially after a little practice, in which case the muscular activity must be slight. Practiced public speakers, especially those who say the same thing many times, are able to think one thing, apparently in verbal form, while saying another.

The presence of muscular activity becomes very doubtful in what is called incipient verbal behavior. The report I was going to say is often followed by behavior which has not been previously emitted even subaudibly. In the same way, a rapid speaker casts a sentence to provide for responses which have yet to appear, and it is difficult to see how this could be done through any sort of rapid silent rehearsal. We break off an unhappy remark before any damage is done, and though we may complete it subaudibly, we break it off first.

We do not need to make any guesses about the muscular or neural substratum which is responsible for these observed verbal events. We can account for the likelihood of emission of a suppressed or manipulated response to the extent that we are prepared to account for any response. We may observe that behavior which would ordinarily be followed by such a response is suddenly interrupted. We thus establish a behavioral fact which a physiological process is assumed to mediate. But the process itself is of no greater importance here than anywhere else in such an analysis. Underlying processes will eventually be identified, but no present or eventual shortcoming in that field can alter our observed relations. The only question to be asked is whether our procedure has been valid. It appears to be possible to deal with the data which have given rise to the notion of covert speech at the general level of rigor which prevails in a science of verbal behavior at the present time.

The significance of subaudible verbal behavior still needs to be discussed. A good beginning can be made by asking why behavior should become covert at all. Operant behavior almost always begins in a form which operates upon the external environment, as the principle of reinforcement requires. The trivial exceptions are responses which are automatically reinforced by the organism itself. Overt behavior becomes covert when, in the first place, its strength drops below the threshold needed for overt emission. Some of the variables may be deficient - as when we say I thought that was Jones, but I see it is not. We have actually emitted the response Jones, but a previous instance is reported as weak because the stimulus was vague. The responses might have been poorly conditioned or partially forgotten, in which case we might have reported I thought his name was Jones. Another explanation is required for behavior which is covert even when it is strong, in the sense of being likely to be emitted under other circumstances. One hypothesis is that the covert form is simply the easiest. It is a well-established principle in non-verbal behavior that the energy level of a response will recede so long as the reinforcing contingency is maintained. When Thorndike's cat was fed for licking its paw, the movement

grew slighter and slighter until it could scarcely be observed. The reinforcing contingency could not, of course, be maintained beyond that point without instrumental amplification. But a considerable reinforcement survives in verbal behavior at the covert level because the speaker may be his own listener and may reinforce his own behavior in many ways. This was one of the most important consequences of our original definition of the field. In general, then, when talking to oneself, it is unnecessary to talk aloud and easier not to.

The continuing strength of the subaudible response is shown by the fact that it will become audible again whenever any advantage is to be gained. We speak aloud, of course, whenever another listener is to be reached, but we also speak aloud to ourselves upon occasion. Though intraverbal chaining can usually proceed with the reduced proprioception of the subaudible response, an audible response is sometimes necessary. In a simple intraverbal sequence like counting money an overt response produces better chaining and is usually emitted in the presence of any distraction. The solution of a difficult problem, mathematical or otherwise, may require overt responses, vocal or written, for the same reason.

But covert speech is not wholly, or perhaps even primarily, a labor-saving practice. A highly significant fact is that the overt form is frequently punished. Overt behavior in the child is tolerated up to a point; then it becomes annoying and the child is told to be quiet. A good deal of negative reinforcement continues into the adult years. It is not always reproof. Speech which is overheard may lead to undesirable consequences of other sorts. The fact is that privacy, that most difficult of all problems, has a practical value. So long as verbal behavior is effective upon the speaker himself as his own listener, it is best to keep it below the overt level. We return to the overt level when the type of audience responsible for the negative reinforcement is absent, although this may take time. It is hard to induce people to think aloud. The very fact of speaking without an audience is embarrassing. Many people blush when using a dictating machine for the first time. A full release of latent behavior at the audible level may come very slowly. The psychoanalytic non-censuring audience is not immediately effective. But the overt form eventually comes through. It is well-known that many people who live alone eventually come to talk to themselves aloud. Deafness sometimes produces the same effect by cutting off the secondary negative reinforcement which arises from hearing oneself. A variation on this theme is observed in beauty parlors, where the etymology of "parlor" - a place where one talks - is revived in a curious way. A hair dryer over the head produces a kind of noise - similar to what my more technical colleagues call "white noise" - which effectively masks speech sounds. Under a dryer a patron is in effect deaf and will sometimes talk aloud. Since the masking noise is negligible to anyone whose head is not in a dryer, this can be heard by the operators, who have, however, reason for suppressing this fact.

In summary, then, covert behavior is behavior which (1) is effective upon the speaker himself and (2) avoids the consequences of the overt form. These characteristics are more important

for our present purposes than any hypothesis as to physiological nature. The special properties of subaudible behavior arise from self-stimulation and they hold as well for talking aloud to oneself. The only important distinction is in terms of the listener, and talking aloud to oneself is properly to be included in the covert class.

It is a great mistake, therefore, to argue that thinking is subaudible talking. It is easy to see why early behaviorism fell into this trap. The pressure to find replacements for mental processes was very great. Something substantial had to be found to supplant the ideas which had previously been supposed to precede and govern overt behavior. Mental processes were in disrepute in the verbal field even before the rise of behaviorism. Delbroeck had answered Wundt by showing that it did not matter which system of psychology the linguist chose. As Bloomfield later put it in criticizing another linguist, "[Paul] accompanies his statements about language with a paraphrase in terms of mental processes which the speakers are supposed to have undergone, The only evidence for these mental processes is the linguistic process; they add nothing to the discussion, but only obscure it." But what alternative could the behaviorist offer?

If you say What are you doing? to someone who is sitting quite still, he may reply Nothing...I'm just thinking. This is possibly the commonest popular conception of thinking - that it is opposed to doing. The argument that thinking is doing was certainly an advance, And very often it proved upon inspection to be that special kind of doing called talking. But small-scale behaving will not serve as a substitute for mental process. The hypothesis that thought is subaudible speech did not actually help the linguist in this respect. If the thoughts expressed by words are the same as other words in subaudible form, what thoughts do the latter express? And so on. It is necessary to look elsewhere for the causes which the concept of thought was designed to provide.

The hypothesis that thinking is subaudible talking is only half right. It correctly identifies a covert activity as a species of, or a special magnitude of, behavior, but in using it to replace a mental process it confuses an effect with a cause. Mental processes are replaced in a science of behavior by the independent variables, by the relations in which they stand to behavior, and by the processes through which the relations are altered. If we were to build an analysis of verbal behavior around these processes, we should have special sections for the acquisition of speech, for the development of fine discriminations, for the analogical extension to new stimuli, and so on. In the present case we have appealed to these processes as fundamental principles in the science of human behavior as a whole. Our classification has been based, instead, upon the types of variables. These are the precursors of verbal behavior which account for the final form which we observe. The idea expressed by a verbal response is in this sense merely the set of its determining conditions. These are not in themselves verbal at all.

Subaudible behavior is simply a kind of verbal behavior. Like whispering, it is distinguished by the energy level or the extent of execution of the response. We might set up a whole

series of levels - from shouting and talking through whispering and muttering under one's breath to vigorously subaudible and faintly subaudible perhaps as far as the "unconscious" case which must be inferred in the case of unconscious problem solving. No part of this range can profitably be set aside for special study in the name of thinking. as Max Muller put it in his Lectures on the Science of Language, "To think is to speak low. To speak is to think aloud." The subaudible case is difficult to observe, either in ourselves or others, and should be avoided wherever possible. This can often be done by simply asking a subject to think aloud. Subaudible behavior has, so far as we know, no special properties. There is no reason to suspect that it does not obey the same laws as overt behavior. No one has ever shown that the subaudible form has greater power or has led to greater achievements. When we study the thoughts of other people, we study their overt behavior. The thought of Galileo or Thomas Aquinas is a record of overt achievement. We have no reason to suppose that subaudible events occurring at about the same time were of any greater importance. The precurent steps in solving a verbal problem may be silent where the final step, in order to affect another listener, is necessarily over. But this is simply a consequence of the fact that the precurent steps do not need to be overt.

Verbal behavior is verbal behavior, whether audible or not. In accounting for it, we shall at the same time be accounting for much of what has previously been dealt with as thought. But we must not make the mistake of supposing that thinking is therefore necessarily verbal. This supposition has followed as a natural consequence of the assumption that thinking goes on inside the organism. When one begins to look inside, to see what one is doing even when motionless, one is likely to hit upon verbal behavior, because it is successful in the covert form. We cannot easily turn a cartwheel or drive a car "silently," because these behaviors depend upon the participation of the physical environment. Verbal behavior, when it does not use a medium, can be emitted under any circumstances. Moreover, we are likely to discover the verbal case during our inner explorations because it is easy to report. The description of verbal behavior is unique among scientific practices because of the strict point-to-point correspondence between "terms" and "things." It is easier to report I said to myself "That's ridiculous" than to describe covert non-verbal behavior which may have been evoked under the same circumstances. Perhaps another reason why thought is so often discovered to be verbal is that many problems are solved by precurent verbal steps even when the final overt response is nonverbal.

But any response can be reduced in scope until it is by definition covert. Most people can turn some sort of elliptical cartwheel privately, and we discover that we are driving from the back seat when, in an emergency, we break into overt form and press our feet against the floor to stop the car. The layman's use of I think covers this kind of behavior. I think I shall be going can be translated I find myself going, I seem to be going, or I am on the point of going. It would be awkward to interpret this by saying that the behavior of going gives rise to the verbal response I am going and that this is qualified by the response I think. It seems to be the non-verbal behavior which is described. The layman also uses I think to describe overt be-

havior. I thought he was listening can be translated I acted as if he were listening. And the admirable expression noted several weeks ago, exemplified by The thought occurred to me to try the door. It was unlocked reports in non-committal terms the appearance in the speaker's behavior of the non-verbal act - trying the door.

Thought is simply, behavior - verbal and non-verbal, overt and covert. The traditional distinction between instinctive and rational behavior is probably worth preserving, and a considerable methodological simplification is achieved by confining our analysis to operant behavior. We shall naturally give closer attention to the higher behavioral processes involved in responding to complex situations, but there is no sharp line to be drawn between this level and the basic processes of conditioning, motivation, and emotion. It is easier to see the-independent variables at work in the simpler case, and hence easier to suppose that some other sort of causal activity is at work in the complex. But the special field of thought established by professional thinkers need not be taken seriously.

A great deal has been written about the effect of language upon thought. It is one of the chief concerns of the semanticist but had attracted attention at a much earlier date. "Language," says Professor Sayce, "is the outward expression and embodiment of thought; but once formed it reacts upon that thought and moulds it to what shape it wills." How can this happen if language and thought are the same thing? The question can be answered quite simply by examining cases. Some of these turn out to be instances in which a verbal response alters or supports a collateral non-verbal response. Others exemplify the limitations of verbal behavior. A casual inspection of the history of science will lead us to predict that other and better thoughts will be possible when a bigger and better verbal repertoire has been developed. We cannot, of course, talk about a thought which has not yet been verbalized - properly expressed, we cannot emit a verbal response which cannot yet be emitted - but we can be sure there are still thoughts to come. Other apparent deficiencies of verbal expression can be reduced to the fact that nonverbal thoughts may have no verbal parallel. But none of this offers any support for the view that thought exists apart from behavior, verbal or non-verbal, or that it is twisted or mangled in the process of expression.

We are concerned here, of course, only with verbal thinking and with characteristics which are either uniquely verbal or at least closely associated with verbal behavior. We may well begin with the characteristic which led to the misunderstanding of the covert case - the fact that verbal behavior is especially effective upon the speaker himself as a listener. Quite apart from the overt-covert argument, what are the special consequences of this fact? All operant behavior affects the behavior - at least through proprioceptive stimulation if not by altering the external environment. But the verbal case is different. By definition the ultimate reinforcement of a verbal response is mediated by a second organism. The speaker is such a second organism with respect to the verbal behavior of others. When in the uniquely verbal case the speaker becomes his own listener, he operates upon himself in a special way. He does not, as in practical or artistic behavior, merely produce a change in the

environment to which he then reacts. He stirs up his own behavior according to his previous experience as a listener. As a speaker he may achieve a measure of reinforcement comparable with the effect which his behavior would have had upon someone else. As a listener he generates in himself extensive behavior comparable with the responses he would have made to another speaker. In analyzing this basic process of soliloquy, we must be careful to distinguish between the effect which it has upon the speaker as speaker, by reinforcing him in a special way, and as listener by providing a particular verbal stimulus which may be the occasion for further action. There are often important differences between the effect of vocal behavior, which is immediate and rapid, and the effect of written behavior, which occurs repeatedly and after long periods of time. But the processes to be described here are essentially the same in both cases.

That one may respond to one's own verbal behavior as an echoic or textual stimulus has already been pointed out. The case is important only when the response summates with other tendencies to produce a sort of self-understanding similar to the case described last week. A good share of intellectual thinking is this sort of self-supplementation. The textual response has a special advantage, and most thinkers get to the paper and pencil stage sooner or later. In thinking out a problem we read and reread the early stages of our solution. This permits us to reinstate responses under slightly altered circumstances and hence to respond to them more strongly and in other ways.

The intraverbal response to one's own verbal behavior has been greatly overemphasized. It is often assumed to be the only important process in verbal thinking. It is true that one verbal response often provides the stimulus for the next. The precise connection may have been acquired with respect to a single occasion, as in a memorized poem, or it may follow from the net intraverbal tendencies already discussed, as in idle thinking. This is the soliloquy proper - as exemplified by its dramatic use. One starts to talk. This determines the verbal behavior which follows, which in turn determines the behavior which follows, and so on. Sometimes novel twists turn up. Dashiell uses Hamlet's To be or not to be as an example. An intraverbal connection between die and sleep leads to another between sleep and dream, and dream then leads to an incipient response which is broken off by Ay, there's the rub. Those who have a predilection for silent speech have urged that a train of thought is merely a monologue of this sort. But this interpretation has never explained how such behavior can be productive. Intraverbal processes are certainly of first importance in verbal thinking, but a simple linkage of responses is little beyond the level of the daydream and deserves to be called, regardless of the respectability of the intraverbal connections, a flight of ideas.

It is not immediately obvious how a speaker benefits from responding to his own behavior when it has the form of the tact. His responses may be valuable to another listener who is not affected by the same stimulus, but the speaker himself is already in possession of the stimulus. Nevertheless, people do talk to themselves, either silently or aloud, in this way. The most important advantage is in making clear a feature of a complex

situation. A special effect arises from the inevitable distortion of the tact relation. The listener who resides in the same skin is an ideal audience in many ways. He speaks the same language and has had the same experiences. He has the same interests and they vary from day-to day in the same way. He is ready for the behavior of the speaker at just the right time. As a result the speaker should be reinforced in good measure and the listener should generally find what is said worthwhile. The only flaw in this otherwise happy marriage is that the reinforcement provided by the speaker as listener does not respect the contingencies which prevail in the verbal environment. There is no reason why the tact relation cannot be stretched at will, first through slight exaggeration but eventually in the extreme manner of fiction and lying. The special drives which have been shown to lead to this sort of impurity are shared by the listener, who will therefore raise no objection. Thus, we rationalize our own behavior by describing it in the most commendable form, and we describe other matters to ourselves in the most favorable light. Unless verbal behavior frequently comes into contact with an external reinforcing environment, the degeneration will not be checked and may become severe. Perhaps this is why people who live alone and talk mostly to themselves often become "queer." Soliloquy of this sort is a derivative behavior which needs occasional replenishment and correction from an external reinforcing agent,

An important exception to the rule that one cannot impart information to oneself should be noted. One may usefully speak to oneself at a later date. From the special point of vantage of the present moment, one may record verbal behavior for later reading. This is the function of the day-book, the diary, and other devices for bridging the present and the future. It is what happens when one takes notes upon a particular occasion to which one can respond after a direct tact would be forgotten. Whether the subsequent use of such material is verbal or nonverbal does not alter the case as an example of a useful response to one's own verbal behavior.

The self-mand is another possibility which may seem absurd at first glance. But we tell ourselves to get up on a cold morning, or to stop when we have made a mistake, or to be sure to remember an errand. The mechanism is not wholly clear. It is easier to say Get up than to get out of bed, and the response may survive by induction from useful instances elsewhere or as a sort of magical extension. But if by any chance it increases the likelihood of getting out of bed, it may be directly reinforced. This would be the case if we respond to our own mands by induction from our behavior with respect to others. But this should eventually suffer extinction, and there seems to be no reason why the self-mand should not disappear eventually from the behavior of the solitary person.

The effect upon the listener which we called instruction is also possible in self-stimulation - not because the listener can be entirely unaware of the coincidence of properties reflected in his own behavior as speaker, but because the full effect of instruction often requires many applications of the verbal stimulus. In thinking out a difficult problem we continually reaffirm to ourselves certain key relationships, especially those which tend to be forgotten or obscured by other matters. In solving a

detective story crime, for example, we may find ourselves deciding that a particular character is guilty because of the evidence carefully prepared by the author in spite of a small but conclusive bit of evidence to the contrary. As we drift again and again toward the wrong conclusion we may find it useful to say something like the following: "No! No! It CAN'T be Billingsgate. Billingsgate was in the conservatory talking to the gardener." We are not, of course, telling ourselves anything we did not know, but we are altering our future verbal behavior with respect to Billingsgate. We make it less likely that we shall emit responses placing him at the scene of the crime at the appropriate moment.

A type of response which alters subsequent behavior in the speaker is of ethical significance. The response ought which has been the subject of extensive discussion, can be interpreted as a statement about the functional relations which control behavior. When we say He ought to have said "No," we assert that there were consequences of saying No, not further identified, which were important either to us or in the ethical case to the person referred to. Telling oneself I ought to say "No" asserts that No is related to certain consequences not further specified. If specifications are demanded and the speaker says that saying No is the right thing to do, this simply means that the consequences are those of right behavior, which can presumably be further specified. I ought to say "No" differs from Say No because the latter simply exploits an old paradigm of relations appropriate to the mand. You must say "No" asserts that under the existing conditions the response No is practically inevitable. Whether these are ethical conditions or not is not clear. When the speaker says to himself I must say "No," his response differs from I ought to say "No" only because an ethical and probably weaker set of conditions is implied by the latter.

The "resolution" is a sort of mand upon oneself which masquerades as a tact. No response can be made to a future event as such. I am not going to smoke for the next three months represents, however, a common type of response. It has a certain value because it can be made now, when the appropriate drives are strong, whereas the non-verbal behavior of not smoking must extend throughout the three months, during which the drive may change. The effect of a resolution is not, according to popular belief, great. By posting a set of resolutions some continuing effect may be had. The resolution seems to be exclusively a verbal response.

The following example of sustained self-stimulating verbal behavior will serve to exemplify most of these points. It is a direct transcription of the response of a nine-year-old girl made to herself as listener while practicing the piano. The behavior was clearly overt, but of the sort which, with a little more negative reinforcement, would have receded to the covert level. The transcription begins after several minutes of similar behavior. A mistake is made—

"No, wait! (Plays correctly and reaches end of piece.) Hah! (Plays a few bars of a new piece.) Let's see. Is that right? I'll do it once more. (Finishes the piece.) Ah, now I can study something else. (Looks at new piece.) That's written in the key of G. (Plays and sings words at same time. Finishes and looks at clock.) That takes one minute. One minute to play

that whole song. (Starts another piece, and makes mistake.) All right, now I'll start the whole thing over. (Makes another mistake.) I'll have to start all over again. (Difficult piece. Emits a few Gosh's. Works on difficult passage.) Oh, my finger, it hurts so much! But I'm going to MAKE it work! (Forces finger against key. Looks at finger.) Hah! Makes beautiful designs on it. (Notices clock.) Wowee! I've taken some of my other things' (time). (Looks at another piece.) Aw, I can't do that! (Notices clock.) Just a minute. (Takes up clock.) I'm putting it back five minutes. There! Got a lot more time to practice. (Plays. Notices clock again.) Hey, don't. Don't do that. You're going too fast. (Adjusts clock.) Better. Five. (Plays and makes mistakes.) Aw! (Looks at clock.) Come ON!. (Adjusts clock. Calls out to father in next room.) Daddy, I'm making this clock go slowly - I don't have time to practice. I turned it around an hour. I've got so much time to practice."

Mands like No, wait, Just a minute, and Is that right? accompany behavior of stopping, looking, and so on. They may have some effect in strengthening such behavior. The resolutions I'll do it once more and I'll have to start all over again precede the behavior which they appear to describe. They may or may not strengthen it, but they may clarify the act as an instance of "starting all over because of a mistake." The tact That's written in the key of G is probably helpful in strengthening the appropriate non-verbal behavior to follow. My finger, it hurts so much, can scarcely be useful in the same way. It seems to be a mere comment - emitted perhaps because of the special strength of the stimulus. The juxtaposition of I'm putting it back five minutes and Got a lot more time to practice may have strengthened further behavior toward the clock. A similar pair of responses occur later and turning the clock back an hour may be the result of the clarification of the connection between moving the clock and having more time to practice. The magical mand addressed to the clock Don't do that. You're going too fast! may also have contributed to the behavior of turning the clock back. There is very little intraverbal chaining in the sample because it is intimately connected with a series of concurrent non-verbal responses. The chaining is from verbal to non-verbal and back again. The example is probably closer to much productive verbal thinking for this reason.

So much for what happens when verbal behavior, conditioned by an external environment, is turned upon the speaker himself. The result is peculiarly verbal because in no other field is the behavior conditioned to respond to the products of his own behavior. This follows from our definition of verbal behavior in a rather devious way that we shall not need to trace out here. The result is highly important. Verbal behavior exerts a sort of control over the listener, and in the case of self-stimulation this becomes self-control. It is of ethical significance when the resulting changes in the speaker are adapted to the needs of other people. It is of intellectual significance when the behavior of the speaker is altered with respect to the complex circumstances called problems.

But although these activities have, severally or together, been called thinking, the really distinctive properties of thought are not bound to the case of the self as listener. There

is no product of self-stimulation which cannot be discovered in the interlocking verbal behavior of two organisms. The great contribution of verbal behavior is the direct overt response which is effective upon an external verbal environment. As we shall see next week, the abiding human achievement is the verbal environment itself, in which individual achievement survives, if at all, only through a change in the conditions which are to produce the verbal behavior of the future. But what are the distinguishing characteristics of the behavior which such an environment engenders?

The basic achievement is the verbal response itself - a clear-cut response of definite topography which can be executed regardless of the external environment but with respect to any feature of that environment. Thanks to the verbal response we can "think of things" without doing anything else about them, just as one might say, the notion of the verbal response itself gives psychologists a way of thinking of things. The inner search for what is happening during thought has never gone very far beyond images, but fortunately non-picturable things can also be thought about. The first move in the present direction was made when it was suggested that the image in abstract thinking might be the image of the word itself. As Professor Sheffield says, "For many ideas, especially for the more abstract or general ones, the reinstating image is simply that of the word; either its muscular articulation, its sound, or both." But the concept of a verbal response permits us to shift the emphasis from image to behavior. When we have progressed beyond the view that thinking is imaging to the view that it is feeling or sensing a current action, then there is no reason why we cannot identify the thought with the action itself and relegate the awareness of action to another field. If there is an act which is equivalent to, or identical with, "thinking of X," it is the verbal response X. It may exist, according to our formulation in all stages of readiness and all degrees of amplitude. Whether we are aware of it in any case, in the sense of being able to respond to it as a stimulus, does not alter the possibility of dealing with it as a potential or putative concept in a science of behavior. Such a response can be made in the absence of X, since it is under the control of other kinds of variables. In the presence of X it may still be useful both to the speaker and to other listeners.

Because a verbal response does not depend upon environmental conditions, it is relatively free from temporal restrictions. Faced with a piece of music at the piano, it is helpful to say That's in the key of G, for our subsequent behavior will probably be more accurate. We could have reacted non-verbally to the conditions of the piece "being in the key of G" by playing it correctly, but this could not be done all at once. The only immediate response which we can make to something which takes place in time or in more than once place is verbal. In the same way, when we verbalize the solution to a practical problem, we not only guide later non-verbal behavior in executing the solution, we state the solution in verbal form all at once and this is a great advantage.

The verbal response makes it possible to think about one property of nature at a time. There is no practical response, as we have seen, appropriate to all instances of red. The abstract tact red is a unique verbal accomplishment. The response fox is

is in effect abstract in this sense, in spite of the fact that since it seems to refer to an object it is usually called concrete. The cognitive response which we make when someone says fox may be nothing more than our own verbal response fox, for we may possess no useful practical response to all foxes. The advantage of the verbal response is not that we cannot respond to a single property non-verbally for that is not true. In different situations we can emit or withhold practical responses of many sorts because of the presence or absence of the property of redness or foxiness. The verbal response is distinguished by the fact that it is, or can be, a response to a single property alone upon every occasion.

In scientific method this characteristic emerges under the general heading of classification. Naming is usually the first step in the study of any subject matter, and the naming of common properties - classification - soon follows. Sometimes the property of nature in control of the classificatory term proves to have functional importance. This has often been received with surprise. An early distinction made for the purposes of a catalogue proves to respect a highly, important theoretical point. But this could happen for two reasons. The preliminary classification could establish the line of inquiry which makes the point important, and only those classifications which have this result might continue in effect for any length of time. The history of science is filled with abandoned classifications. How the status of the classificatory term changes when its functional significance is discovered is a more difficult problem.

Some properties of nature can be reacted to only with verbal responses. An elementary case is number. Numbers of objects beyond the immediate span of attention - numbers which can not control discriminative responses in the form of tacts - can be counted. In a non-verbal way we might show that two piles of marbles contain equal numbers by setting each marble on one pile opposite a marble on the other pile. But we could not say how many marbles each pile contained. A response to the number of a number of things is made by emitting an intraverbal sequence, one response for each object. There are other ways of reaching the same response - for example, adding the numbers obtained by counting separate parts of the pile - but these are merely part of a more elaborate intraverbal system called arithmetic.

Another consequence of the fact that a verbal response is relatively independent of external circumstances, when compared with a practical response, is that it is easy to make guesses, or, in science, hypotheses. A guess is not essentially verbal. We guess that a door latch works in a particular way when we try it that way. Perhaps the lock is only faintly similar to locks which have opened that way in the past. Our guess is confirmed if we are successful, and in the future we may emit a well-conditioned response.

The response is under scarcely adequate stimulus control.[†]

But the guessing which can be done with verbal responses is prodigious. We characterize a vague or puzzling situation in many ways on the basis of very tenuous stimulus control. This can be done when a non-verbal confirming response will follow

only after many intraverbal steps have been taken. Thus we can guess about states of affairs which are not directly accessible in non-verbal behavior, and only by guessing in this way can we advance to responses which will strengthen practical behavior. The deductive method is exclusively verbal.

[†]Lastly we have to consider the advantage which arises from the fact that recorded units of verbal behavior (words) are mechanically manipulable. The advantage has been greatly overestimated by psychologists and logicians alike. Watson's conception of verbal thinking was expressed as follows:

The process of word building is of the conditioned reflex type - the subject is stimulated by an object - simultaneously with the presentation of the object, the subject is stimulated by the word. The word, so far as the reaction is concerned, becomes substitutable for the object. The individual thus becomes possessed of a word universe adequate in all particulars to call out all of his organized reactions (e.g., all of his verbal and non-verbal habits)... It is possibly beside the point to show that the individual does manipulate his universe of objects: that trial and error manipulations bring new adjustments in the word universe in the form of judgments, verbal conclusion, propositions, and the like, just as they bring new adjustments in the object field - inventions, discoveries, etc. It follows without further argument, that the individual can plan in words, daydream, dream and the like just as he can arrange and rearrange the objects before him - idly ... or systematically.

We may note in passing that this begins with a definition of verbal behavior for the listener only, and that the speaker is regarded as thereupon spontaneously "using" words for the sake of their stimulation value. Watson's autoclitics are longer and less cautious than Russell's in dealing with a similar issue: It is possibly beside the point to show and It follows without further argument. Actually it is very difficult to show, and it certainly does not follow without further argument, that one manipulates his word universe as he manipulates his universe of objects. In what way can a novel combination of words yield a result which is comparable with the result of a novel combination of non-verbal responses? We cannot put together the words for the various materials for a cake, put them all in a verbal oven, and check our skill as a cook by tasting the verbal product. Verbal responses can be emitted in any order, if the order is determined by some system outside the verbal tendencies of the speaker, because the execution does not depend upon external conditions, but we have no guarantee whatsoever that effective orders will result and we have no way of finding out within the verbal field itself. In some exploratory thinking we may supplement our own verbal behavior by the arbitrary manipulation of terms. We may hit upon a solution to a problem while reading a set of mechanical permutations and combinations, but the effect is to evoke a latent response already in some strength. We accept the mechanical solution as we would accept it in the verbal behavior of someone else. The arbitrary arrangement works according to the principle of the verbal summator. We have been exploring our thoughts, not by manipulating an orderless world of words[†] but by sounding out our own latent verbal behavior in which the final order already exists in some strength.

In the fields of logic and mathematics a different sort of manipulation is possible but it is not concerned with the words which are "substitutable for objects" but with autoclitic frames and

intraverbal sequence. The possibility of checking the result within the verbal field itself arises from the internal consistency and possibly the redundancy of such material. Thus we define a term in a given way, let X equal something or [†]other, or draw AB parallel to CD. In this way we control our subsequent behavior with respect to specified forms of response. Through intraverbal rules which arise from established paradigms called laws, formulae, and so on, we may pass from one form of response to another - say, from the response (A times B plus C) to (A times B plus A times C). But the view that this is the manipulation of independent tokens is illusory. We begin, not with inert forms, but with verbal responses - forms which say something; and our only justification for pursuing these lines is that we expect to come out with forms which say something too. It may be of no great practical value to recall that we are always working with verbal responses - that writing down, or cancelling, or transposing, or letting something equal something else, are all verbal responses painfully acquired in a narrow and difficult verbal environment, but the alternative figure of speech which represents the process as a game of solitaire in which one deals out so many cards with words written on them and rearranges them in various ways is dangerous.

One of the final accomplishments of a science of verbal behavior will be an empirical logic. In spite of the energetic efforts of modern logicians to stake out a special corner of the verbal universe, it is clear that most of what logic has done in the past is relevant to a study of this sort. The problem of reference, universals, particulars, ostensive definition and so on, has its place in a causal analysis. The Laws of Thought are rules regarding autoclitics. The syllogism and the modern parallel in symbolic logic are further analyses of a particular class of autoclitics and of the possibility of constructing effective new sentences from old.

The argument that logic is concerned with form is spurious. It is impossible to deal with form alone. Logic emphasizes the secondary verbal behavior, frequently without reference to the primary behavior which appears in any given instance. But secondary behavior, no matter how easily it may be reduced to symbols, is not form. It is behavior, too - acquired through a rather long and difficult history of the speaker and needing the constant correction which logic, as a prescriptive discipline, has to offer. The attempt to set aside a special field of just those sentences which are true or false must also fail. Logic is then committed to only part of the field, but it is still dealing with verbal behavior. Truth and truth-value, and verification, have analogues in a scientific account - whether in empirical validation or in the internal consistency of sets of autoclitics.

Perhaps it is unwise, as Professor Richards has recently suggested, for a science of verbal behavior to adopt an imperialist attitude toward the other linguistic disciplines. The logicians are worth cultivating, because they have already contributed much to the analysis of verbal behavior and it is highly desirable that they contribute more. But whatever advantage the individual logician may gain from the retreat into formalism, it is important that a common goal be recognized, and that we proceed, not only to characterize human thought in the most expedient terms, but with a little luck, to undertake the engineering application which seems to be necessary if we are ever to think bigger and better thoughts.[†]

The autoclitic response, defined in an earlier lecture as a verbal response controlled by prior verbal behavior which alters the effect of the prior behavior upon the listener, is peculiarly verbal in several ways at once. It can have no effect upon a non-verbal environment, it cannot arise except in response to a verbal state of affairs, and it is the only way in which we can respond to our own incipient, covert, or overt verbal behavior - with respect to which a non-verbal response cannot be differentially reinforced. When we advance, then, from a single verbal response with all its special advantages to the complex response which contains an autoclitic, we are well ensconced in the verbal field and comparisons with non-verbal behavior are idle. When we respond blue and sky in the presence of a blue sky, our behavior will have the sort of special effects already discussed. But when we add the quantifying autoclitic The and the autoclitic of assertion is and say The sky is blue, we leave all possible non-verbal analogues far behind.

This can scarcely be demonstrated in a better way than by pointing to the frantic search which has been made for the special referent of the sentence as against the word. The "idea of the sky being blue," the "fact that it is blue," the proposition expressed in English as "the sky is blue" but in other languages in other ways - these are all vestiges of the old search for causes. The search continues in the case of sentences even after some simple - probably oversimplified - psychological theory of the word has been adopted. Psychologists themselves have played a role. But in a science of verbal behavior we have only two classes of events - the physical conditions in the past and present history of the organism (which we undertake to describe in the language of physics) and behavior. The physicist himself also responds to blue skies in a verbal and probably fairly synonymous way, and we as students of verbal behavior must do likewise. We cannot get away from our own verbal behavior - a fact which was acknowledged in the first lecture by an appropriate motto from Emerson - "When me they fly, I am the wings." We are committed to studying the second class of events, the behavior of the speaker, by using our own behavior to the first class, our descriptions of external states of affairs. When we say that the state of affairs which controls the response The sky is blue is a blue sky, we are perhaps not in an enviable position on every count. But at least we do not need to construct any "Fact that the sky is blue" or a preverbal proposition to that effect.

This is, of course, a question which has been pretty continuously debated for two thousand years. It is one of the more exciting prospects of a rigorous science of verbal behavior that a satisfactory solution may be at hand. It was foreshadowed by the doctrine that the idea was the word itself, but this now appears to be a relatively crude disposition of "idea," which does not recognize the alliance between ideas and causes. John Horne Tooke came closest to an early statement because unlike the

philosophers of his time, he was an active student of verbal behavior. He disposed of Locke in the following way:

"Perhaps it was for mankind a lucky mistake (for it was a mistake) which Mr. Locke made when he called his book, *An Essay on Human Understanding*. For some part of the inestimable benefit of that book has, merely on account of its title, reached to many thousands more than, I fear, it would have done, had he called it (what it is merely) *A Grammatical Essay, or a Treatise on Words, or on Language*."†

He concludes his interpretation of Locke's Essay in this way:

"... I only desire you to read the Essay over again with attention, and see whether all that its immortal author has justly concluded will not hold equally true and clear, if you substitute the composition [association] &c. of *terms*, wherever he has supposed a composition, &c. of *ideas*."†

What Tooke lacked was a conception of behavior as such. He was still under the influence of British empiricism and, in spite of an heroic declaration of independence, of Grammar. Perhaps he came closest to the modern position when he wrote:

"The business of the mind, as far as it concerns Language, appears to me to be very simple. It extends no farther than to receive Impressions, that is, to have Sensations or Feelings. What are called its operations are merely the operations of Language. A consideration of *Ideas*, or of the *Mind*, or of *Things* (relative to the Parts of Speech,) will lead us no farther than to *Nouns*: i.e. the signs of those impressions, or names of ideas. The other Part of Speech, the *Verb*, must be accounted for from the necessary use of it in communication. It is in fact the communication itself: and therefore well denominated *Ῥημα, dictum*. For the Verb is QUOD loquimur; the Noun, DE QUO."†

Here, struggling against an enormous weight of tradition, Tooke is talking about verbal behavior. He has "disabbreviated" the puzzling terms which cannot be accounted for by appeal to images - terms which we would classify here as autoclitics - and has found that they are verbs. This leads him to an important generalization which we could paraphrase in this way. Some verbal responses are evoked by external states of affairs. These Tooke wants to call nouns. Other responses are communication itself. They affect the listener and have no function aside from that effect. Tooke wants to call them verbs. Writing more than a hundred and fifty years ago, he had perhaps no alternative, but a fresh formulation is possible today.

The one useful sense in which we can say that the verbal response itself is the fact or the idea or the proposition is that it has the effect of singling out an aspect of nature. It is in this sense that we can say that science is a set of propositions. Science is not nature itself, for that existed long before scientists. Nor is it sheer verbal form. Science, as knowing, is human behavior, and a very large part of it is verbal behavior. Incidentally, it may be that we have been delayed in arriving at a proper understanding of the status of facts and ideas because a verbal response is, in a rough sense, the name of itself. More precisely, we talk about talking by emitting similar responses. Thus, when we talk about the verbal response

The sky is blue we are talking about some instance of verbal behavior having that form. We deal with it in its relation to an event which we must also describe with at least a synonymous expression. It is little wonder that it has taken many centuries to get the matter straight and that it may take another century or two more.

The value of the verbal response which asserts is demonstrated by the enormous collection of the records of such assertions. Human knowledge, apart from the behavior of the individual, is almost entirely in this form - from copybook maxims to theoretical physics. It is one of the tasks of a science of verbal behavior to clarify the nature of such material, as we shall see next week.

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CHAPTER TEN: The Place of Verbal Behavior in Human Affairs

It is time to take stock. Our analysis of verbal behavior is finished, but several questions remain to be answered. From the point of view of scientific method, what sort of analysis is it? What basic conception of verbal behavior has emerged? And if this conception is reasonably correct, what is the place and function of verbal behavior in human affairs?

First, a brief summary. We began with a decision to avoid certain historical prejudices and to attack verbal behavior in the raw form in which it was observed. Our subject matter was not taken to be "symbolic" behavior or behavior possessing any special sort of meaning. I think this provision has been respected. "Verbal behavior" has throughout been so used in this crude sense. It has been broken into parts - into "responses" - whenever a part could be shown to be under the control of a separate variable, so that our units - the so-called tacts, mands, and so on - have specified more than behavior itself. But the additional material has always been on the side of the independent variables. No change in the nature of the response itself has been implied.

A special field of verbal behavior was defined in terms of the necessary mediation of reinforcement by another organism. This was the alternative to a definition as symbolic or meaningful behavior. It has not only served to define a field which is usefully considered as a whole; it has pointed up the special features of verbal behavior more sharply than the doctrine of meaning. Uniquely verbal characteristics have been derived from the definition more directly and in greater number. Thus, the definition specifies, among other things, that the effect of verbal behavior will be relatively independent of its energy level; that thousands of different responses can be executed with the same limited musculature; that verbal behavior is normally very fast; that its strength is always somewhat modified because its reinforcement is never inevitable and may be long delayed; that a verbal response will always be represented in some inorganic form, which can usually be preserved and transmitted; that a speaker will also be a listener and that his potentialities will be greatly increased in both roles when he listens to himself; that responses of different form may lead to the same effect; that responses of the same form may lead to different effects; that verbal behavior is normally under the control of more than one variable, with a wide range of consequences which include some of the characteristics of style and wit, distortions of form, and one species of understanding; that a verbal response can be controlled by a single property or feature of the environment, as in abstraction, and may be extended, metaphorically or otherwise, through a very tenuous similarity in stimuli; that responses of novel form may be emitted on novel occasions and may be effective upon a listener without special preparation; and that verbal behavior itself may become one of the variables affecting the later behavior of the speaker - a characteristic which leads on the one hand to the problem of awareness and on the other to an interpretation of logic, mathematics, and other disciplines in which verbal behavior is manipulated. This is no mean achievement for a definition which can be stated in ten words. We need not be concerned with whether it does the work of older definitions for it sets aside a much more comprehensive, and at the same time a much more unitary,

field.

Our fundamental datum was taken to be, not a verbal response as such, but the probability that a particular response would occur at a particular time. The notion of "probability" of response, or "likelihood" of response, or simply response "strength" was essential to the analysis at every stage. It was especially useful in considering multiple causation and the secondary behavior of making sentences.

We undertook to account for the strength of a verbal response by examining every event which could be shown to have an effect upon it. This led to a classification of the types of independent variables and hence of the types of verbal responses. In three cases the controlling variables were verbal, and a response was classed as echoic, textual, or intraverbal according to the mode of correspondence of formal properties of stimulus and response. In another type of response - the mand - the principal variable was a drive. The audience was defined as a prior stimulus controlling groups of responses. The final case in which the independent variable is a non-verbal thing or event has usually been regarded as crucial, it is often the only case covered by a definition in terms of meaning, but it was dealt with (under the name of the tact) with the same kind of functional analysis as the other classes of responses. The relation was seen to be susceptible to distortion through incidental or accidental reinforcing contingencies, and to yield to generic or metaphorical extension as a normal behavioral process.

When two or more variables were operative at the same time, the preferential strength of response was classified variously as "choice of synonyms," "multiple meaning," various formal devices of prose and poetry, distortion and intrusion of response, the use of supplementary sources of strength in prompting and probing, as in the protective techniques, and eventually, in considering the behavior of the listener or reader, as an important contribution toward the understanding of verbal behavior.

It follows from the formulation that upon any occasion which is to some extent novel, a large number of responses will be strengthened in some degree, some of which will be effective if emitted and others not. The novel situation, which might include a novel listener, was found to give rise to another sort of behavior on the part of the speaker, who was shown to respond not only to the variables in the external situation, but to his own verbal behavior at the same time. The speaker characterizes his own responses as tacts, mands, and so on; he indicates controlling variables; he suggests their adequacy or inadequacy; he arranges his responses in the most effective order; and he emits or withholds a response after taking the ultimate effect into consideration. The result is that the listener is more effectively controlled than if primary responses were emitted uncritically according to strength or in order of stimulation.

The behavior of the listener was treated separately. The effect of a verbal stimulus was divided into four categories: (1) responses which occur because of prior Pavlovian conditioning; (2) operant behavior in which the verbal stimulus serves as the occasion for successful action with respect to other, usually non-verbal circumstances; (3) a process of conditioning called

instruction, which is revealed by later changes in behavior, although there is no immediate response on the part of the listener; and (4) the supplementary evocation of similar behavior. The interpretation of a symbol according to the principle of the conditioned reflex was shown to cover only the first, and most trivial, of these cases. A total act of speech was accounted for by interlocking the analyses of speaker and listener and showing that the interchange between them was adequate to account for the conditions which it had been necessary to assume in dealing with each separately.

Some of the special achievements of verbal behavior are traditionally considered under the heading of Thought, but we found no reason to assign any special advantage to covert behavior nor even to restrict the field of thinking to the verbal case. All conditioned behavior may appropriately be called thought, though we may wish to direct special attention to complex processes. Those which are peculiarly or particularly verbal were accepted as part of the present field. We considered the case in which the speaker stimulates himself as a listener, but the principal achievement is the verbal response itself, regardless of the listener. The verbal response makes it possible to react to a single feature of the environment and to the special condition called a "fact" - for which the traditional meaning theory had invented the notion of a preverbal "idea" or "proposition." Another advantage in verbal behavior is the possibility of constructing new useful responses by manipulating old ones. The goal of a science of verbal behavior in this direction was described as an empirical logic.

The entire analysis has been carried out without setting up any principle or process not already established in the field of non-verbal behavior. We defined a field with many new characteristics, some of them exclusively verbal, but it has been analyzed with the same basic terms (e.g. stimulus, response, reinforcement) and the same basic processes (e.g., conditioning, discrimination, stimulus induction) as obtain in the non-verbal field. What is new are certain temporal and intensive conditions of reinforcement, certain sequences of variables, perhaps including the prior behavior of the speaker, certain subtle differentiations of form of response, and so on. These are extreme conditions, but they are not different in kind. Verbal behavior does not require any special ability or process. This is our justification for disposing of concepts, like idea, meaning, and symbol. They are not needed, and they are too dangerous to be preserved by special definition. If the notion of a symbol, for example, can be reduced to a behavior process, it should be discarded rather than redefined. But there is no reason to suppose that an exact behavioral parallel will appear in a scientific analysis. Supposed reductions have been, as we have seen, faulty.

The field of verbal behavior is so wide and many of its subdivisions are fascinating, but I have tried to hew to a single line laid out in my first lecture. What is needed first of all is a general formulation. We want to know what verbal behavior is like as a scientific subject matter, how it can be described, what variables can be shown to affect it, and in what ways. In analyzing it into functional relations we draw up a sort of preliminary map to be used in more intensive studies of particular regions. The number of relations which need to be explored is very large. You

have been very patient as I have set forth a great many of them, but I may plead in my defense that there were many more I could have mentioned. The field is extremely complex and any analysis which conceals that fact cannot be ultimately successful.

I have not been concerned with reaching a high degree of validity. In general, examples have taken the place of experimental proof, even though the latter was often available. It would have been possible to make a fair show of being "scientific" with the aid of charts, tables, graphs, and equations. Some of the relations referred to could have been given tentative mathematical expression. But it would not have been possible to complete the analysis if this had been done, because detailed experimental procedures and statistical analyses take time. (Incidentally, I have omitted or slighted my own researches in the field as well as those of others.) In any case, no chain is stronger than its weakest link. The plausibility of the analysis at this stage does not depend so much upon convincing proof of a few scattered points as upon the ability to describe an extraordinary range of data in a single formulation. A sufficient contact with reality has, I think, been maintained for this purpose.

Those who cannot rest secure until an experimental check has been made need not be unhappy. The requirements of scientific practice have been kept in sight. The framework of variables used in the analysis was borrowed from an experimental study of non-verbal behavior. A definition of verbal behavior as behavior rather than as signs or words or sentences is ideally suited to experimental investigation. So far as I know, we have been dealing with the only purely dependent and measurable variable ever defined. The assumption has also been made throughout, and I believe that practice has followed assumption, that our independent variables were specifiable in physical terms. No appeal has been made to a "psychological stimulus" assumed to be distinct from, or an interpretation placed upon, a physical stimulus. A term like "drive" has been used merely as a shortcut to refer to specifiable operations which alter the strength of behavior through deprivation and satiation. "Ideas" and "meanings" were attacked simply to make way for "causes."

It is the principal purpose of an analysis of this sort to set up the data in a form adapted to scientific investigation. The investigation must come later, but it is important at the moment that verbal behavior as defined have highly favorable prospects as a research field. And this is the case. Techniques of recording vocal behavior have been greatly improved within recent years, and standard research procedures appropriate to various parts of the field are well established. Under the influence of formal linguistics, a strong tendency survives to study recorded speech by itself, where the only available independent variables are certain verbal events included in the record. This may be adequate for some purposes. Thus, we can study formal and thematic groupings in a recorded sample, even though we may know very little about the conditions under which the behavior was emitted. If the record is of the behavior of two or more speakers (for example, if it is an interview), verbal stimuli may be important and perhaps all-sufficient. But in general a text or other record of verbal behavior provides only half the data needed in a scientific study, and there seems to be no reason to con-

tinue to work under that handicap. Recordings obtained under known conditions are another matter.

A good many relevant data can be collected from direct field observation. Methods of observation and analysis have been well developed in the study of the speech of children. If the present analysis has anything to offer here, it is perhaps in minimizing the use of time as an independent variable. The growth of a vocabulary, or of any other aspect of verbal behavior no doubt is important, but variables which are under the control of the investigator, as time is not, are usually closer to the central problem of verbal behavior. The genetic account has a limited usefulness. Acquisition has been appealed to because it has seemed to be the only indicator of a tendency to respond, but the concept of probability of response relieves some of the pressure on the concepts of learning and maturation.

Modern sampling and survey techniques are opening the adult field to comparable studies. Any opinion survey is a study of verbal behavior and the techniques can be adapted to questions of theoretical interest. The data required is simple enough.[†] Under what circumstances do men emit responses of given sorts, and how do they respond to various sorts of verbal stimuli? The importance of data of this sort can scarcely be overestimated.

As soon as the investigator begins to control and measure his variables, he becomes experimental in a narrower sense. A laboratory is often required, and is usually to be preferred. Both standard and artificial languages can be studied experimentally. The conditions under which a response is acquired or forgotten, the way in which a response is extended to new stimuli, the interaction between different forms of response, are established experimental problems centrally related to verbal behavior. Almost the whole of the experimental literature on memory is relevant.

Verbal behavior has been studied from the point of view of the controlling stimulus in the fields of sensation and perception, from the point of view of drives and emotions in studies on projection, with respect to supplementary evocation in the field of suggestion and hypnosis (an exclusively verbal phenomenon), and with respect to intraverbal and autoclitic responses in the field of the so-called high mental processes, including reasoning and verbal problem solving.

The present analysis may lead to the reinterpretation of some of this material to a shift of emphasis, to the substitution of different explanatory concepts, but the relevance is further evidence of the fact that we are, after all, concerned with human behavior as a whole, and that to delimit a special field of verbal behavior is by no means to set apart a small subdivision.

The very characteristic which makes the analysis susceptible to experimental test also gives it practical significance. Current interest in verbal behavior is, of course, largely due to the realization that the linguistic devices of society are not working well. We do not understand each other, even within a relatively homogeneous culture, and intercultural or international understanding scarcely exists at all. Linguistic achievements in advertising and propaganda are viewed with awe but are allowed to continue

unchecked. The transmission of knowledge in education is mainly a verbal process, is inefficient and faulty. The scientific use of language in the analysis of nature has curious weaknesses, and the effective practices are so unclear that each individual is left to discover them for himself. All hope of teaching a person how to think seems to have been abandoned. Personal adjustment in the family and in business is disturbed by linguistic shortcomings, and when the clinician steps in to put matters in order he discovers his own inability to make effective contact with his client.

All of these practical problems have suddenly, in the Age of Words, been laid at the door of language. No one who studies any aspect of verbal behavior can long remain unaware of them. They are the driving force responsible for Semantics, and other concerted efforts to do something about the matter. But there is a great gulf between enthusiastic program and achievement. Civilized men have always felt the need for verbal guidance. The legal profession, for example, deals almost exclusively in words. It specializes in promoting understanding. It is the lawyer's business to say how a contract or law should be drawn up so that it will mean the same thing to all parties and to future interpreters. It is the business of the judge to decide what a witness should be allowed to say or forbidden to say to a jury so that justice will be done. The educator is another merchant of words - not only the basic words of a language but of all the collocations of words called knowledge. It is his business to say what words and what collocations of words should be part of the verbal repertoire of people in a community. The public speaker, the advertiser, the commanding officer, the writer, the clergyman, the politician - all are specialists in language. They may have theories of language, but we shall do well to avoid going into that here. What is important is that their practices are not by any means optimal, and they have not shown much improvement. The semanticists have brought together a number of verbal problems which had previously been treated separately, but they have not developed any essentially new techniques for solving them. And it is at just this point that a central science of verbal behavior becomes important.

The issue is broader than the verbal field, for it involves the relation between pure and applied science in general. There is usually a great gulf between the early practice of the experimental scientists and the technologist who deals with the same material. But as the fields develop, they grow more alike, and it is the technique of the pure science which eventually prevails in both. The technologist, in order to deal with immediate facts and problems, must develop rules of thumb. His terms refer to gross observable characteristics and properties, and he may neglect materials and processes which are of no use to him. In the early stages he achieves whatever control he needs by selection. He finds a harder metal or a dyestuff which will resist fading, or a variety of plant which will thrive in a given climate, or a man who will be a happy streetcar conductor all his life. Later he begins to make metals and better dyestuffs. The biologists have already made better plants by manipulating genetic elements, and psychologists will eventually make happier streetcar conductors if they are needed. But this shift from selection to creation requires a sort of control which is typical of experimental science and for which experimental methods are ideally suited.

In the field of verbal behavior the applied sciences are not without methods or achievements at the present time, among which we may note the measurement of verbal abilities, the classification of the many ways in which one may be deceived by words, the detection and cataloguing of verbal traits in both speakers and writers, surveys of the techniques of propaganda, the interpretation of meaning through paraphrase, the observational study of meaning through the effect upon the listener, and so on. It is astonishing how little of this has advanced the control of verbal behavior. The need for control may be clarified and suggestions may be offered regarding the direction in which control should be sought, but it is in the very nature of these activities that control itself is not achieved.

Yet the practical problem is primarily one of control. In propaganda we want to control the behavior of the listener more exactly and more efficiently; in defending against propaganda we want to reduce that control. In therapy we want to control the behavior of the speaker, to get him to talk or to talk in a certain way, either to the clinician or to himself. In education we want to control both speaker and listener to an extraordinary extent. We want to know not merely how to measure verbal traits, but how to change them. We want to know not only why certain lines of verbal thinking lead to trouble but how to build effective verbal practices.

The applied scientist is often impatient with the "pure" experimentalist because he does not seem to be talking about important things. Nowhere is this truer than in the present field. Much of what I have said in these lectures will strike the practically minded as a quibble about irrelevancies. But practical theories of verbal behavior stand convicted by their own impotence. And we can see why this should be so. The correlational analysis of verbal behavior seldom yields manipulable variables, and non-statistical practices on the same pattern are no more successful. The doctrine of meaning stands in the way of progress in the remaining part of the practical field because it provides a substitute for the causes of verbal behavior which ought to be investigated. From theoretical considerations alone we can show that a functional analysis is already farther advanced toward the solution of practical problems than rule-of-thumb procedures. Unfortunately, it is not the purpose of these lectures to develop the application of the analysis to practical problems, but that application has not been entirely neglected. Many students of language, especially those with naturalistic leanings, have emphasized certain broader functions of verbal behavior. A given verbal act is shown to be adaptive or to work for the benefit of the group. Some accounts of language stop short at this point. But the fact that an act is adaptive or otherwise desirable does not explain its origin or maintenance as part of the behavior of the individual. A causal account is still needed. These principles are relevant to a functional analysis, because they refer in a general way to the broad consequences which explain the origin and survival of verbal behavior in human affairs.

There is, first of all, what might be called the social gain. Our definition of verbal behavior specified two organisms. When a man talks to himself it is assumed that this is a by-product of his behavior with respect to other listeners or of his behavior as listener to other speakers. Although the verbal process takes

place within a single skin, an interpersonal or social event is required to establish it. In this sense our definition respects the function of verbal behavior which was probably first to emerge. The most primitive examples of verbal behavior involve the coordination of a group. DeLaguna traced this function from the warning cries of animals through the signal systems of primitive cultures - for example, the smoke signals of American Indians. Malinowski, in his appendix to *The Meaning of Meaning* emphasized the same coordinative function, especially in connection with group activities like hunting and fishing. The verbal behavior of more highly developed cultures retains a measure of usefulness of the same sort. Through verbal behavior an individual or a group controls other individuals or groups. Some of this is not always obvious. Christian theology and Freudian psychology agree in attributing to social origins the inner mechanism of self-control - the conscience or the super-ego. The individual speaks of himself as the vicar of society^f and thus controls himself in the interests of others. The control is not necessarily despotic. The coordinative function works for the benefit of the individual as a member of the group.

It also comes to work for the benefit of the individual alone. In verbal behavior the receptors of one individual can be said to control the effectors of another. One man sees the fish, another pulls the net. In a further stage a middle-man may neither observe nor act beyond the verbal level. This division of labor leads to an aspect of verbal behavior which may reasonably be called knowledge. This is science in the broadest sense. The social coordination becomes secondary or remote and the verbal response emerges simply as a way of responding to the world of things. Recorded languages show the growth of effective verbal repertoires, as more and more of the properties of nature come to control separate responses. These lead to more effective verbal and nonverbal action. An example of the usefulness of verbal knowledge is the transmission of non-verbal skills from craftsman to apprentice. As Mach first pointed out, the practical rule was probably the beginning of scientific law.

The possibility of recording, preserving, and transmitting verbal behavior adds nothing new to this function but extends, it enormously. The tremendous verbal repertoire of the contemporary speaker is due to the verbal discoveries of thousands, perhaps millions, of previous speakers.

This function of verbal behavior is served best by a response which is entirely controlled by some feature of the external environment rather than any condition of the speaker - in other words, the pure tact. This is, as we have seen, probably an ideal. There is always some selection, some bias. Moreover, we must recognize certain necessary limitations, not unlike the Kantian *a priori*, arising from the nature of verbal behavior itself and from the processes by which correspondences between verbal responses and nature can be achieved and improved. But every effort to make verbal behavior more objective in this sense and to work out better and better correspondences is, of course, worthwhile.

Just as the scientific gain arises from the social gain which probably preceded it, so both of these lead to what we might call the personal gain. Once equipped with a large verbal repertoire the individual emits responses which are not effective

according to the original relations. Part of this is a sort of emotional or aesthetic by-product. The autonomic responses of the listener do not play any important role in either the social or scientific uses of languages. But verbal behavior may come to be emitted largely because of this effect upon the speaker himself. When his behavior is recorded and read by another individual, there is a similar personal gain, which is one of the principal contributions of literature.

Another personal function requires a different explanation. Verbal behavior provides a way of "doing something about" a state of affairs when no practical action can be taken. This has been called verbal magic, escape, sublimation, and catharsis. The starving man talks about food, the lover pretends to converse with his beloved, the aggressive person fantasizes an episode in which he tells off his enemy, Samuel Butler gives vent to his father-hatred by writing a book in which a father figures in an unfavorable light, and Lewis Carroll continues to torture young children, year in and year out, on the verbal rack called Alice in Wonderland. In a causal account we have to explain simply why behavior of this sort is emitted, and this is not too difficult. The behavior, whether in literary disguise or not, is strong for reasons which can at least be suggested if not proved. The relief is another matter. The emission of large quantities of verbal behavior seems to have curative properties. Various neuroses, not to mention psychoses, have apparently been alleviated by a sudden and exhausting logorrhea. Some therapists have concluded from this fact that talking it out gives relief, that inability to talk it out has caused the trouble. As Hamlet says, "But break, my heart, for I must hold my tongue." But the therapeutic problem is beyond our present range. In all cases of this sort we note simply that speakers emit strong verbal behavior, the poet writes a poem as a hen lays an egg. Both seem to feel better afterward.

The emotional and releasing effects of verbal behavior are uppermost in literature. This is compatible with the view which has been taken of literary behavior during these lectures. In writing a story or poem the writer places himself in a position in which verbal behavior is emitted without respect to external conditions and within certain limits without fear of censure. The discovery of new literary techniques has generally been the discovery of new situations or new disguises in which verbal responses may be more freely emitted. The result is a freer extension of the magical mand, a freer extension of the metaphorical tact, the appearance of very weak intraverbal connections, the capitulation to feeble multiple sources, the omission of grammar and other autoclitics, and so on. Literature is therefore an exaggeration of normal verbal behavior and is for that reason an especially useful datum in a scientific analysis.

There is no conflict between the aims of literary and scientific behavior. They are not opposed, but, if anything, complementary, and neither ever appears in pure form. The mathematician prefers the more elegant form, and literary people have been known to emit important and relatively exact statements from time to time.

These three functions of verbal behavior - the social, the scientific, and the personal - seem to be exhaustive. They provide a broader

view of the significance of verbal behavior but it may be worth repeating that they are in no sense a substitute for a causal analysis. Nor will they enable us to simplify that analysis in any important respect. Much remains to be done, and it will be hard work.

A favorite way of disposing of objective psychology is to argue that if the position is sound, the objective psychologist must be as mechanistically determined as his subjects and hence that his verbal behavior cannot be valid or certain or true. Russell puts it this way:

When the behaviorist observes the doings of animals, and decides whether these show knowledge or error, he is not thinking of himself as an animal, but as an at least hypothetically inerrant recorder of what actually happens. He "knows" that animals are deceived by mirrors, and believes himself to "know" that he is not being similarly deceived. By omitting the fact that he - an organism like any other - is observing, he gives a false air of objectivity to the results of his observations...When he thinks he is recording observations about the outer world, [the behaviorist] is really recording observations about what is happening in him.

This is probably a fair shot. The hardiest positivist will recognize a tendency to believe that what he is saying is, for the moment at least, reserved from the field of determined action. It is not quite fair to pin the problem on the behaviorist, however, because knowing about knowing, in any sense, would appear to involve the same difficulty as behaving about behaving. Russell's statement is puzzling, not so much because of the basic dilemma, but because of the terms in which he expresses it. He has the behaviorist deciding whether the doings of animals show knowledge or error instead of, as is more likely, recording a predisposition to act with respect to a given set of circumstances. And he described the behaviorist as "reporting his observations about the outer world," although "observation" is suspiciously like "idea" or at least "image" and would probably be avoided in favor of an expression like "reacting to the outer world." But the crux of the problem survives in translation. The present study offers an excellent case in point. If what I have said is reasonably correct, considering the present state of knowledge in the science of human behavior, what interpretation is to be placed on my behavior during the past ten weeks, or the ten or more years of work on the subject which preceded them? I have been behaving verbally - I am sure you will agree to that - and unless my analysis is deficient at some point, my behavior must have followed the processes already set forth and no others. What does this mean with respect to the certainty or truth of what I have said?

This is no time to abandon our program. Let us see exactly what I have been doing. To begin with, I exposed myself to a great deal of material in the field of verbal behavior. This was not a deliberate act. It followed from a growing interest in the field, which followed from other circumstances too remote to affect the present issue. The hundreds of books and articles on the subject which I have read are not a direct exposure to the subject itself, but they have generated in me verbal tendencies with respect to it

which shows an enormous variety and a fabulous inconsistency. I have also gone directly to the data. I have read books not about verbal behavior but as records of verbal behavior, and I have done my share of comma counting. I have watched people speaking and found excuses to leave the room to jot down slips or curious phrases or interesting intraverbal sequences. (For the benefit of my friends I may add that I have now stopped doing this.) I have watched subjects in the laboratory responding to the faint patterns of the verbal summator, filling out word-association blanks, and so on.

Of all this I have made notes - a great many notes. The last time the express company weighed them, they came to an even fifty pounds. These were my first reactions - to verbal behavior itself and to verbal behavior about verbal behavior. In the course of time I arranged and rearranged this material, using several sorts of mechanical filing and an elaborate decimal notation, so that similarities and differences could be respected. I discarded many classifications and saved a few which seemed to work. In this way I arrived at what seemed to be useful and productive properties of verbal behavior - properties which proved to be worth talking about. My explorations in this direction were, I think, helped by work in the field of non-verbal behavior. Gradually there emerged a minimal repertoire which singles out the special aspects of verbal behavior which we have taken to be our dependent variables and various kinds of circumstance in the past and present environment which we have accepted as our independent variables. During the past ten weeks I have put this repertoire to the test by making a final running account of what seem to be the more important divisions of the field of verbal behavior.

As to the other side of the medal, what has been the effect upon you? I have not tried to induce any autonomic behavior in you and shall not be disappointed if you report that you have not salivated or wept or blushed at anything I have said. I have not tried to arouse immediate overt action and am quite content that you have not shouted Down with Aristotle! or tried to burn the library. The effects I have hoped to get fall in the last two categories of the classification of the behavior of the listener - instruction and supplementation. I have not described much new material. You have not, I am afraid, learned many new facts, and I could have limited myself to facts with which all intelligent people are familiar. It was not my main purpose to present the facts of verbal behavior. That is why I have not been concerned with experimental or statistical proof.

Some instruction has, I hope, taken place in the form of definition. I have invented a few new terms - "mand," "tact," "autoclitic," and so on, which are perhaps now part of your vocabulary, though in what strength I would not want to say. I have repeatedly used some terms which are perhaps more familiar to you now than they were ten weeks ago. I have, as it were, exercised a particular verbal repertoire with the express purpose of strengthening it in your behavior. Putting the matter in the most selfish light, I have been trying to get you to behave verbally as I behave. What teacher, or writer, or friend, does not? And like all teachers and writers and friends, I shall cherish whatever you may subsequently say or write in which I think I can detect my "influence."

If I have strengthened your verbal behavior in this way

with spurious devices of ornamentation and persuasion, then you will do well to resist, but I plead not guilty. If I were solely interested in building a verbal repertoire, to get you all to say Polly wants a cracker, I should have behaved in a very different way myself. I should have shortened and simplified my formulation and created catch-phrases, with alliterative or other forms of support. I should have used jokes to engender a receptive mood, hypnotic devices full of repetition to drive home new responses, and irrelevant intraverbal sequences to make my arguments seem to follow with a special force or aptness. I should have spoken more slowly, more clearly, and with my best approach to the intonation of the announcer for the March of Time.

But I was not solely interested in imparting a verbal repertoire. The responses which I have tried to get you to make have been useful to me. They have singled out events or aspects of verbal behavior which have made subsequent behavior more expedient. I have emphasized certain facts and ignored others. The justification for this is that these facts do seem to belong together, and that in talking about them to the exclusion of other facts, greater progress is made toward a simplified account. In this sense I have tried to "heighten your interest" in a special field.

I have wanted you to pay more attention to this field and to talk about it in a special way because I myself have done so with pleasure and profit. I have assumed a common interest in the field of verbal behavior. It is my belief that something like the present analysis reduces the total vocabulary needed for a scientific account. We eliminate more terms than we create, and the terms we create are derived from a few prior technical terms common to the whole field of human behavior. I can honestly say, as one who has applied the analysis to more fields than have been covered in these lectures, that it works. It has reached the stage where it does more work for me than I do for it. It swallows new material avidly yet gracefully, and good digestion seems to wait on appetite. Hundreds of puzzling questions and obscure propositions can be forgotten. The new questions and propositions which arise to take their place are susceptible to experimental check.

In many ways this seems to me to be a better way of talking about verbal behavior and that is why I have tried to get you to talk this way too. But have I told you the truth? How can I tell? A science of verbal behavior makes no provision for truth or certainty. We cannot be certain of the truth of that!

A good many years ago, dining at the Society of Fellows, I found myself seated next to Professor Whitehead. We dropped into a discussion of behaviorism, which soon became unusually energetic. It was an opportunity to strike a blow for the cause and I did not often overlook chances of that sort. Professor Whitehead was equally earnest - not in defending his own position but in trying to understand, first, what it was that I was trying to say, and, second, how I could possibly bring myself to say it. We eventually reached a state of equilibrium. Professor Whitehead agreed that a science of behavior might be successful in accounting for human behavior provided one made an exception of verbal behavior. Here, he insisted, something else must be at work. I was in no position to argue otherwise. He brought the

discussion to a close with a challenge. "Let me see you," he said, "account for my behavior as I sit here saying, 'No black scorpion is falling on this table.'" At six o'clock the next morning I took a large sheet of paper and drew up plans for the present study.

Perhaps it is time to consider Professor Whitehead's challenge. Can we account for the fact that he said No black scorpion is falling on this table? As a particular instance of verbal behavior, emitted under a set of circumstances now long since forgotten, we cannot. It is as unfair to ask a science of behavior to do this as to ask the science of physics to account for the changes in temperature which were taking place in the room at the same time, assuming that these changes could now be reconstructed at least as accurately as my report reconstructs the verbal response. In both cases we have a rough account of an event which we must formulate as a dependent variable. We have little or no information about the independent variables of which it was a function. The physicist cannot do much with a thermographic record alone. He knows that he does not have the whole story. He may suggest that a sudden drop in temperature might have been caused by someone leaving the door ajar. If this was not so, he may suggest that a window was opened. If this was also not the case, he may suggest that the heat was turned off. And so on. It is obvious to the physicist and to everyone else that these are merely guesses.

The devastating truth is that we have been led to expect something else in verbal behavior. Linguists make extensive use of recorded speech with little or no information concerning the conditions under which it was recorded. The logician analyzes sentences as "form" alone. The critic interprets literary works written centuries ago. And almost anyone will tell you what a random remark "means." We are all in the position of thermographs. As systems which have upon past occasions reacted in much the same way, we are eager to say what must have caused a particular change in a particular thermograph. But if it were easier to check the validity of the interpretation of meaning at this level, the practice might long since have disappeared from the behavior of responsible people.

I can supply a few relevant facts about the conditions under which Professor Whitehead made this remark. For example, there was no black scorpion falling on the table. And the response was of a particular type. It was emitted to make a point. It came, as it were, out of the blue. It was probably weakly determined as to form. There was little reason why he might not have said rose petal or autumn leaf instead of black scorpion. This was, in fact, the point of the example. It was meant to be a poser just because the response did not refer to anything present. If this was behavior, where was the stimulus? But this is the kind of case the Freudians love, because it is at just such times that latent verbal reserves get their chance. Perhaps there was a stimulus which led to the remark black scorpion falling on this table, which in turn led to the autoclitic No. It may not have been much, but in a determined system it must have been something. Just as the physicist may suggest various explanations for the drop in temperature merely to show that it could be explained in lawful terms, so it is not entirely beside the point

to make a guess in the case. I suggest then, that the black scorpion was behaviorism.

Science seems to be inevitably iconoclastic. It usurps the place of the explanatory fictions which men have invented as prescientific devices to account for nature, and for reasons which are not entirely unfamiliar to psychologists, the explanatory fictions are usually more flattering than the scientific accounts which take their place. Hence, as science advances it strips men of their fancied achievements. The Copernican system shoved man out of the center of things, and astronomy has never ceased to assign to him a smaller and smaller share of the universe. Darwinism dealt the fancied preeminence of man another blow by suggesting a greater continuity with other animals than man himself had wished to recognize.

And while the science of chemistry was on the one hand crowding the supposed unique accomplishments of living systems into a tighter and tighter corner, the science of anthropology and comparative religion was shaking man's confidence in his channels of communication with the supernatural. It was inevitable that psychology should enter these lists. The Freudian emphasis upon the role of the irrational was offensive enough, but the controlling forces in the Freudian scheme of things remained within man himself, no matter how unworthy they may have seemed. The crowning blow to the apparent sovereignty of man came with the shift of attention to external determiners of action. The social sciences and psychology reached this stage at about the same time. Whenever some feature of the environment - past or present - is shown to have an effect upon human conduct, the contribution of the individual himself is reduced. The program of a radical behaviorism left no originating control inside the skin.

Those of you who knew Professor Whitehead will understand that he would do his best to understand such a view and to interpret it in the most generous way. He would probably have been happy, for example, to discover that the matter was entirely terminological and that the position was identical with some earlier philosophy which had either been disproved or had left an opening for human responsibility and creativeness. It is entirely possible, then, that as I described my position - probably in the most shocking terms I could command - he was telling himself that the part he had played in encouraging this young man was not entirely misguided, at least that this was probably not typical of all young men in psychology and the social sciences, that there must be a brighter side, and that on this pleasant and stimulating table, no black scorpion had fallen.

If that is the explanation - and it is, of course, only a guess - then the example was, I think, appropriate enough. There is no cause for alarm. The history of science is the history of the growth of man's place in nature. Men have extended their capacities to react discriminatively by inventing microscopes, telescopes, and thousands of amplifiers, indicators, and tests. They have extended their power to alter and control the physical world with machines of many sorts. Part of this achievement has been verbal. It is largely through complex verbal behavior that the techniques and achievements of one man have been preserved and improved and transmitted to other men. The growth of

science is positively accelerated, and we have already reached a breathless rate of advance. Scientific method is the only method which has produced a cumulative effect of this sort, and the only method which is ready to be tested in terms of its achievements. These recommendations can scarcely be overevaluated.

There is no reason why scientific method cannot be turned to the study of man himself - to the practical problems of society but above all to the behavior of the individual. We must not turn back because the prospect suddenly becomes frightening. The truth may be strange, and it may threaten cherished beliefs, but as the history of science shows, the sooner a truth is faced, the better. No scientific advance has ever actually damaged man's position in the world. It has merely characterized it in a different way. Indeed, every achievement in one sense has increased the role which men play in the scheme of things. If we can eventually give a plausible account of human behavior as part of a lawfully determined system, human power will rise even more rapidly toward its maximum. Men will never become originating centers of control, because their behavior will itself be controlled, but their role can be extended without limit. The technological application of such a scientific achievement cannot now be fathomed. It is difficult to foresee the verbal adjustments which will have to be made. "Personal freedom" and "responsibility" will make way for other by-words, which in the nature of by-words will probably prove satisfying enough.

It has been necessary from time to time to attack traditional concepts which assign spontaneous control to the special inner self called the speaker. Only in this way could we make room for the alternative explanations of action which it is the business of a science of verbal behavior to construct. But whatever your opinion of the success of this venture, I hope you will agree that the analysis has shown respect for human achievement, that it is compatible with a sense of dignity - in short, that no black scorpion has fallen on this table.

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Editor's Notes

(See the preface for an explanation of the policy about editorial changes.)

- P. i, *To be printed by Harvard University Press*: It appears that in 1948 Skinner thought that his manuscript was nearly ready for publication, but nine years were to elapse before he had a document with which he was satisfied.
- P. 4, *The logician's analysis proves to be of no value to the critic*: This clause was underlined in the original, but it seems no more salient a point that those which follow, all of which are elaborations of the previous sentence.
- P. 4, *Meaning of Meaning*: Ogden, C. K., and Richards, I. A. (1923). *The meaning of meaning*. London: Routledge and Kegan Paul.
- P. 5, *describing in which Jack asks Jill for an apple*: The direct object of *describing* is omitted in the manuscript. Presumably *describing "a scenario"* would serve the purpose. In 1934 or 1935, Skinner wrote, in a letter to Keller, "[Bloomfield's] text, *Language*, contained a simple analysis of verbal behavior in which Jill asks Jack to get her an apple, but it was oversimplified, and not much was made of it in the rest of the book." (*Shaping of a behaviorist*, p. 150.)
- P. 6, *Sapir*: Sapir, E. (1921). *Language: An introduction to the study of speech*, New York: Harcourt, Brace, and Co.
- P. 10, *analyze*: In the manuscript this word is sometimes spelled *analyse* and sometimes *analyze*. Both are acceptable, but I have adopted the standard American spelling throughout simply for consistency.
- P. 10, *report*: This word was missing in the manuscript, but the sense clearly requires it, as indicated by the independent clause that follows.
- P. 11, *interpreted by a person*: Grantchester is a town near Cambridge University where Ogden and Richards collaborated.
- P. 12, *something which is thought of*: This paragraph appears to endorse the importance of the three factors identified, but that would be a misreading, as the subsequent paragraph and everything else Skinner has ever written indicate. He seems to be characterizing traditional formulations.
- P. 12, *whereas the words...*: The manuscript reads *as when the words...*, but the sense requires *whereas*. Apparently the original manuscript was difficult to read at this point, for the following caution was inserted at the end of the sentence: (*Last few preceding words may not be exactly right.*) I removed the cautionary passage, as it was apparently inserted by Skinner's secretary and is not part of the text.
- P. 14, *causal science*: the manuscript reads *casual science*, but that is presumably an error.

- P. 16, *Absit omen*: "May no harm result." Skinner was being uncharacteristically tentative about the relevance of the study on non-verbal organisms for the interpretation of verbal behavior. No doubt this line was under audience control.
- P 17, *neuron*: Skinner used the acceptable but non-standard spelling "neurone."
- P. 17, *When me they fly*: In the original manuscript, the line reads, "When me they fly, I am with wings," no doubt a transcription error. The line is cited correctly in *Verbal Behavior*. L. J. Henderson, who recommended the line, was an important early influence on Skinner. He was the chairman of the Society of Fellows at Harvard in 1933 when Skinner and Quine were elected as junior fellows. Skinner left Cambridge several years later, and Henderson died in 1942, so the "earlier draft of the present manuscript" to which Skinner alludes is probably his early notes on the topic that he composed in response to Whitehead's challenge and presumably does not refer to a complete document. The line is taken from Emerson's poem, *Brahma*:

If the red slayer think he slays,
Or if the slain think he is slain,
They know not well the subtle ways
I keep, and pass, and turn again.

Far or forgot to me is near;
Shadow and sunlight are the same;
The vanished gods to me appear;
And one to me are shame and fame.

They reckon ill who leave me out;
When me they fly, I am the wings;
I am the doubter and the doubt,
And I the hymn the Brahmin sings.

The strong gods pine for my abode,
And pine in vain the sacred Seven;
But thou, meek lover of the good!
Find me, and turn thy back on heaven.

Skinner made economical use of this poem. Compare the last line, "Find me, and turn thy back on heaven," to Frazier's remark to Burris in Chapter 28 of *Walden Two* (p. 250 of the 1969 paperback edition):

"Forget me, and turn your face on heaven."

It was typical of Skinner to slip literary allusions into his writing without fanfare, and, as in this case, without much concern whether the allusion would be detected by the reader.

Perhaps it is relevant that Skinner claimed that Frazier's mannerisms were modeled, in part, after those of Henderson (*Shaping of a Behaviorist*, p. 296). Note that *Walden Two* was written during Skinner's Guggenheim year, when he was working on the document that was to become the William James Lectures.

- P. 19: My copy of the manuscript has no Page 19. Perhaps the numbering of Page 20 was an error, or perhaps Skinner meant to leave a blank page between chapters but either abandoned the policy or forgot to do so for later chapters.
- P. 26, *we observe a response*: Skinner used abbreviations inconsistently throughout the document. *Response* was usually written out in the early pages; it then was abbreviated to either *R* or *r*, with the latter dominating as the text progressed. A *response* was abbreviated to *An r*, suggesting that Skinner "heard" the abbreviation, as such, as he composed the text.
- P. 31, *other than those which*: Something is clearly wrong with this passage. In the manuscript, the text runs together where I have inserted an ellipsis. It appears to me that a line has been omitted. I have split the text at the point where I believe the omission occurs in order to preserve the sense of the second sentence. Rather than try to reconstruct the presumed omission, I refer the reader to the corresponding passage from *Verbal Behavior*:

Several other classes of mands may be distinguished in terms of the behavior of the listener. In mediating the reinforcement of the speaker, the listener will occasionally enjoy consequences in which the speaker does not otherwise participate but which are nevertheless reinforcing. When these consist of positive reinforcement, we call the mand *advice* (*Go west!*). When by carrying out the behavior specified by the speaker the listener escapes from aversive stimulation, we call the mand a *warning* (*Look out!*). When the listener is already inclined to act in a given way but is restrained by, for example, a threat, the mand which cancels the threat is commonly called *permission* (*Go ahead!*). When gratuitous reinforcement of the behavior of the listener is extended by the speaker, the mand is called an *offer* (*Take one free!*). When the speaker characteristically goes on to emit other behavior which may serve as reinforcement for the listener, the mand is a *call*—either a call to attention or the "vocative" call-by-name. (P. 40)

- P. 46, *another kind of control to be discussed later*: Here the manuscript simply reads *control*, but something has clearly been omitted. The corresponding passage in *Verbal Behavior* reads:
- Most of the "facts" of history are acquired and retained as intraverbal responses. So are many of the facts of science, though responses are here also frequently under another kind of control to be discussed in the following chapter. (p. 72)
- P. 53, *notion of a proposition*: The manuscript reads *action of a proposition*.
- P. 63, *applied*: The manuscript reads *supplied*.

- P. 64, *and metaphoric extension*: In the manuscript this sentence has no predicate and ends with *adventitious property*. The following passage from Verbal Behavior suggested the bracketed insertion:

The distinction between generic and metaphorical extension is between a contingent and an adventitious property of the stimulus. Generic extension respects the original reinforcing practice, which persists unchanged in the verbal community even though the range of effective stimuli may be extended as more and more instances with new collateral properties are reinforced. The total number of stimulus properties respected by the language is not increased. In metaphor, however, new properties of nature are constantly being brought into control of verbal behavior. These become stabilized as standard tacts, subject in turn to further generic or metaphorical extension. (P. 95)

- P. 66, *negative reinforcement*: Today the term *negative reinforcement* is restricted to escape contingencies. In Skinner's early work he used the term to mean punishment.
- P. 67, *not*: The manuscript reads *now*.
- P. 80, *as a good pun requires*: In finding fault with Shakespeare's word play, Skinner errs. In Warwick, the Bard's native shire, a golden lad was a dandelion, and a chimney sweeper was a dandelion gone to seed. Thus the trope is a triple pun with three sources of strength and, far from weak, is exceptionally elegant.
- P. 80, *satisfied all the requirements*: Skinner attributes this quip to Samuel Johnson, the 18th century lexicographer, but it has also been attributed to Ben Jonson, the Elizabethan playwright as well as a French nobleman in the court of Louis XV. Boswell, who would have surely seized upon the witticism, does not mention it, lending credence to Ben Jonson's claim to it.
- P. 88, *piney top*: The manuscript reads *ninety top*, but that is obviously wrong. *Ninety* is not an appropriate modifier of *top*, so it would have been a very weak response in this context, and as the name of no cranial nerve begins with *n*, *ninety* would be useless, or worse, as a mnemonic. In *Verbal Behavior* the corresponding phrase is rendered *piney top*. Errors such as *ninety* for *piney* confirm that the manuscript of the William James Lectures was transcribed by a secretary from hand-written notes. Against this interpretation, the reader might object first, that the standard mnemonic is *On old Olympus' towering top...*; second, that the fourth cranial nerve is the *trochlear*, which does not begin with a *p*; and third, that the name of no other cranial nerve begins with *p*. However, the trochlear nerve was formerly called the *pathetic* nerve because of the characteristic gloomy cast of those who had suffered damage to the nerve, so in Skinner's day, *piney* was an appropriate mnemonic.
- P. 88, *textual response*: This is the earliest description of which the editor is aware of the phenomenon of joint control,

which has been shown to be an important variable in matching-to-sample procedures and other complex behavior. See the work of Barry Lowenkron, e.g., Lowenkron, B. (1998). Some logical functions of joint control. *Journal of the Experimental Analysis of Behavior*, 69, 327-354.

- P. 98, [to it may not]: Something appears to have been omitted at the end of this sentence. The bracketed phrase is one minimal suggestion. The intended point of the sentence seems to be that it is odd that a stimulus should control a verbal response while the nature of that control itself is ineffective in controlling a secondary verbal response.
- P. 98A: This short page was inserted in the original manuscript.
- P. 99, *occurs to me*: The quotation *Oscar might be able to help you* was underlined twice in the manuscript to indicate its nesting within the larger utterance.
- P. 101, *the privatives a- or -less*: The manuscript reads, *the private a- or -less*, but this is clearly a transcription error, one that confirms beyond a doubt that the text was copied from a handwritten original by a secretary. A *privative* is a prefix or suffix that denotes absence ("privation").
- P. 104, *qualifiers*: Skinner apparently meant to write *quantifiers*, as the subsequent discussion shows. These terms are called *quantifying autoclitics* in *Verbal Behavior*.
- P. 105, *scholar of the late 18th century*: Reference: *ΕΠΕΑ ΠΤΕΡΟΕΝΤΑ or The Diversions of Purley* (2nd Ed.) by John Horne Tooke, published in London, 1798. ΕΠΕΑ ΠΤΕΡΟΕΝΤΑ means "winged words" in Greek, a metaphor that Tooke attributes to others, and is meant to suggest that it is words that permit our ideas to soar. Tooke was an 18th-century British philologist and parliamentarian who was often in trouble with the Crown and with other powerful agencies. Born John Horne, he adopted the surname of a rich patron, William Tooke, when he became the latter's heir. *Purley* was not an idle fellow who diverted himself with etymological musings but the name of the town in which William Tooke's estate lay, and was therefore the locus of many a retreat that provided John Horne Tooke the leisure to write his book on words.
- P. 106, *Tookian*: In *Verbal Behavior* Skinner spells it *Tookean*, which indeed seems preferable.
- P. 109, *acquired*: Manuscript reads *required*, but the sense seems to call for *acquired*.
- P. 111: Skinner speaks of responses to incipient behavior here and elsewhere. The term *incipient* suggests the initial portion of an incomplete response, but it is also possible that the subject is responding to the independent variables of which the behavior is a function. "I was about to ask for the salt," might be a response to some distinctive recruitment of articulatory apparatus, but it is also possible that it is a response to all of the contextual variables that normally

evoke asking for the salt. Thus the validity of the analysis does not depend on the assumption that the initial portions of a response can be tacted as if they were the response itself. That is, the status of incipient behavior can remain unresolved for now.

- P. 118, [. . .]: The manuscript is blank here. A plausible interpolation would yield: "The first term is a verbal stimulus, which gains control of the second term, a non-verbal response, because of a double contingency with the third term, a reinforcement."
- P. 118, *tacts*: The manuscript reads *takes*.
- P. 118, *blackboard*: The manuscript includes no diagrams, but it is evident that Skinner displayed on the blackboard diagrams like those in Figures 1-6 of *Verbal Behavior*.
- P. 121, *speaker* [. . .]: The sentence is incomplete in the manuscript. Presumably it should read, "A tendency to make the response follows from the fact that any situation which is the occasion for a successful response of the same form in another speaker [is likely to be an occasion for a successful response by oneself.]"
- P. 121, *context*: The manuscript reads *complex*.
- P. 125, *pairings*: The manuscript reads *springs*.
- P. 129, *when*: The manuscript reads *or*.
- P. 139, *form and meaning*: The manuscript reads, *The only possible explanation has seemed to be that this is a subtle connection between form and meaning*. The term *this* might refer to the *something more* of the preceding sentence, but the present reading is much smoother, and it provides an intended meaning that is at least as defensible as that offered above.
- P. 141, *without*: In the manuscript, *without* is missing, but the sense seems to require it.
- P. 141, *discussed*: The manuscript reads, *dismissed*, which is possibly correct, but it seems to me that *discussed* is intended.
- P. 143, *the announced topic of*: This fragment is the only part of Pages 142 and 143 in the original manuscript that is continuous with the text of Page 141 and Page 144. (See Preface.)
- P. 144, *may be lacking*: In the manuscript, the phrase *needed for the response* follows rather than precedes the phrase *may be lacking*.
- P. 144, *a fairly difficult paper, and*: The manuscript reads *a fairly difficult paper, or*. *And* seems required.
- P. 158, *stimulus control*: This sentence dangles in the manuscript, as reproduced here. I interpret it as a vestige from his hand-written draft. Perhaps at the end of a writing session he scribbled it as a point to be taken up upon returning, for the sentence foreshadows a point made in the

following paragraph. If so, he forgot to cross it out, and it survived transcription.

- P. 159, *Lastly we have to consider*: The dagger marks the beginning of the text inserted from Page 142 of the original manuscript. (See Preface.)

- P. 159, *world of words*: The manuscript reads, *world or words*. It is possible to read this as meaning *an orderless world*, or *orderless words*, but there are several reasons for assuming that my reading is correct: The paragraph includes the thematic word *universe*; a secretary's misreading of *or* for *of* is plausible; and *r* and *f* are both index-finger letters on a typewriter, making substitution errors more common than in other cases.

- P. 159A, *other, or draw AB*: The dagger marks the page break between Pages 142 and 143 in the original manuscript. (See Preface.)

- P. 159A, *bigger and better thoughts*: The dagger marks the end of the inserted passages from Pages 142 and 143 of the original manuscript. The ensuing text, up to the next page break, at the end of Page 159B, appears on Page 159 of the original manuscript. That is, Page 159B of the present document is identical to Page 159 of the original manuscript. From Page 160 onward, the pagination of this document matches that of the manuscript. (See Preface.)

- P. 160, *on Language*: Skinner's secretary was hampered by the limitations of the typewriter keyboard and by the difficulty of interpreting Skinner's writing when the words were unfamiliar. The three quotations on this page are unfaithful to the original text and apparently also to Skinner's draft, for some of the errors were evidently second-order transcription errors. Consequently, I have modified all three to conform to the original 1798 source, including Greek characters and Tooke's distinctive use of italics and the upper case. To be faithful to Skinner's secretary's interpretation of his handwritten transcription of a passage written in an archaic font would be to perpetuate a number of errors that would only mislead the scholar. The first quote is from Tooke, p. 31f.

- P. 160, *&c. of ideas*: Tooke, p. 38.

- P. 160, *Noun, DE QUO*: Tooke, p. 51. The words, *ῥῆμα* and *dictum* mean *word* in Greek and Latin respectively. The Latin expression *quod loquimur* means *what we say*, and *de quo* means *about which*. The reason for the mingling of italics and upper case letters is unclear to me. He may have been trying to achieve prosodic contrast to emphasize that verbs are what we say, and nouns are the things we talk about.

- P. 166, *The data required is simple enough*: Pedants, paddling against the current of popular usage, never tire of scolding undergraduates for using *data* as a singular noun. Since Skinner was a fastidious writer, this suggests brief carelessness, a transcription error, or perhaps evidence that academics had not yet made a fetish about the usage of that

term. On Page 170 Skinner uses *datum* for a singular case, indicating that he was sensitive to the status of *data* as a plural noun.

- P. 169, *vicar of society*: It is unclear if this sentence says what Skinner intended. A vicar is a "substitute" for a higher ecclesiastical agent (hence the term *vicarious*), so an individual might indeed act as a "vicar of society." However in other writings (*Verbal Behavior*, *Beyond Freedom and Dignity*, and *About Behaviorism*), Skinner indicates that it is the "superego," or "conscience," that is the vicar of society, and this meaning seems more consistent with the present paragraph. Skinner makes the point more clearly in *About Behaviorism*:

But [the superego, or conscience] is "a major sector of the psyche" only in the sense of "a major part of human behavior," and it is mostly unconscious only because the verbal community does not teach people to observe or describe it. It is mainly the product of the punitive practices of a society which attempts to suppress the selfish behavior generated by biological reinforcers, and it may take the form of imitating society ("serving as the vicar of society") as the injunctions of parents, teachers, and others become part of its repertoire. (p. 151)

- P. 177: The page numbers at the head of each page of this document correspond exactly to those of the original manuscript, except for the inserted pages, 159A and 159B. Thus the manuscript ends at Page 176. The pagination of the endnotes simply continues the sequence.