

I

INTRODUCTION

I. PRELIMINARY CONSIDERATIONS

DYNAMIC PHILOLOGY has the ultimate goal of bringing the study of language more into line with the exact sciences. To this end it views speech-production as a natural psychological and biological phenomenon to be investigated in the objective spirit of the exact sciences from which its methods have been taken. Our chief method of procedure is the application of statistical principles to the observable phenomena of the stream of speech.

In this introductory study our primary aim is the observation, measurement, and, as far as it is possible, the formulation into tentative laws of the underlying forces which impel and direct linguistic expression. Our first interest will be in the relationship which exists between the form of the various speech-elements and their behavior, in so far as this relationship is revealed statistically. The findings which result from this initial interest may be viewed as dynamic laws of speech with general applicability, though they are offered, of course, subject to future corrective experimentation. These dynamic laws can presumably be similarly demonstrated from the material of any known language.

Our second interest will be to relate the above dynamic laws with the familiar phenomena of meaning and emotional intensity which have generally proved elusive to direct quantitative analysis. The findings resulting from this second phase of our investigation may be taken only as inferential conclusions; their validity can be apprehended

against the general statistical background of the dynamic laws, yet the conclusions themselves can probably never be established numerically because of the nature of the phenomena involved.

In turning now to an investigation of the dynamics of speech we are but taking the next logical step in the development of linguistic study. Previous studies of language which have made this step inevitable have also furnished the student of speech-dynamics with a large body of historical and comparative material so accurate that he may now expect to fare both well and far, even in an introductory investigation. Indeed, perhaps nothing can more expeditiously familiarize the reader both with the objectives to be sought and with the material to be used, than a very brief survey of the main aims and achievements of the formal linguistic disciplines — historical grammar, comparative philology, and descriptive phonetics — in which the present investigation had its origin.

Not until during the last hundred years have the historical facts of language been studied with scholarly accuracy. To the early scholars of this comparatively short period we owe much of our knowledge about the historical relationships of the many and diverse Indo-European languages.* These early scholars, or as we might say, early philologists, also propounded far-reaching questions involving an aesthetic, cultural, ethnological, and psychological evaluation of their newly discovered linguistic facts.¹ However, with the coming of a new generation of students of language, interest gradually became restricted to the detailed comparisons and explanations of single words, forms, and sounds. With this second step the older philology became *linguistics*, while linguistic study became the very accurately descrip-

* Frequently termed the *Aryan* or the *Indo-Germanic* languages. Throughout this investigation we shall employ the term *Indo-European*, which has found wide acceptance in English-speaking countries, to designate the large family of languages in question.

tive field of specialized historical research as we know it today. Whether because of the perhaps premature nature of the generalizations of the early philologists, or whether because of the absorbing interest of a series of brilliant discoveries¹ which resulted solely from the detailed comparisons of sounds and forms, the larger significance of language, both in respect to other cultural activities, as well as in respect to the rest of human behavior, was now lost sight of.

It was only natural that the later linguists should have been severely censured for their extreme specialization in interests and technique, especially since the expressions of some modern linguists have indicated a firm belief that any comprehensive scientific linguistic generalization was in itself a downright evil.² Of course not all students of language have followed the restricted paths of linguistics. Indeed one of them, Otto Jespersen, eminent alike for achievements in philology and linguistics, has chided the modern linguists in no uncertain words for putting entirely out of court all questions relating to the cultural and psychological implications of their field of research.*

However, in spite of the frequent censure of linguistics, it is difficult to believe that linguistics has been entirely mistaken in the direction it gave to language study. Certainly no student of speech-dynamics can for a moment regret the stringency of the historical and comparative disciplines which have provided him with immediately available material. Furthermore, he cannot forget that these same censured linguists were the ones who proved conclusively, as we shall see at a more opportune time, that phonetic development, whatever its amorphous and random appear-

* Otto Jespersen: 'These great questions have to be put over and over again, till a complete solution is found; and the refusal to face these difficulties has produced a certain barrenness in modern linguistics, which must strike any impartial observer, however much he admits the fertility of the science in detailed investigations. Breadth of vision is not conspicuous in modern linguistics, and to my mind this lack is chiefly due to the fact that linguists have neglected all problems connected with a valuation of language.'

ance may be, is essentially an orderly process with a high degree of precision. Without this previous auspicious knowledge that phonetic development is orderly, few persons would today dare to undertake an investigation of the causal laws behind speech-activity. Just as the student of astro-physical laws cannot with propriety condemn the laborious, careful, and ingenious camera-work of the observers and recorders of the historical acts of astro-process without which his own more general studies would be impossible, so too the student of speech-dynamics, in acknowledging his great indebtedness to linguistics, can only hope that linguistics will in the future continue just as stringently along the same fruitful paths.

In the present investigation, however, and under the heading of *Dynamic Philology*,* we are returning to the comprehensive views of language held by the early philologists who believed that speech-phenomena cannot be isolated from the content of speech, nor from the personal, social, and cultural backgrounds of the speaker. Naturally, we are returning with more data than they possessed, and with the equipment of some scientific methods and information doubtless unknown to them. From an observation of extensive data we now know definitely that (1) the patterns of everyday speech are by no means essentially incommensurable with (2) the patterns of style, of metrics, even of music, and that a sober study of the dynamics of the former may well lead to a profounder comprehension of the dynamics of the latter. Having been constantly reminded by psychologists that language is a delicate indicator of the activity of the mind, we must not forget that the laws governing the formation and behavior of speech-patterns may also subtly reflect the laws governing other patterns of behavior. If it is not for us to divert our main attention to the findings of

* The term *Dynamic Philology* is preferable to *Dynamic Linguistics* because the former avoids the implication that our aims and methods are restricted to those reflected in the achievements of the latter.

investigators of these non-linguistic patterns of behavior, it is nevertheless our duty to explain our findings in such terms that investigators in these same fields of non-linguistic behavior may be able to follow — especially since Dynamic Philology is more closely related in aims and methods to these psychological, biological, sociological, and aesthetic fields than it is to the formal disciplines of historical linguistics.

With this preliminary discussion behind us, let us now briefly view the manner in which we shall approach the study of speech-dynamics and consider the advantages of our particular method in dealing with the problems which will arise.

2. MANNER OF APPROACH AND METHODS OF ANALYSIS OF DYNAMIC PHILOLOGY

The manner with which one approaches the study of a field of inquiry determines to a considerable extent the particular method to be employed. Both our manner of approach and method of analysis are each only one of possibly many different valid approaches and methods.

a. The View of Language as an Implement of Behavior

In spite of the abundant uses to which speech is put and despite the numerous angles from which speech may be viewed, nothing has ever been found in the nature of speech in any of its manifestations which is not completely comprised in the statement that speech is but a form of human behavior. To appreciate the implications of this statement, which will be of importance to us later, let us for the moment view language against the general background of all behavior of which it is but a part.

To begin, it may be said that every organism is placed in an environment against which it must defend itself and from which it must gain its support. For this battle of self-defense and self-support, every organism is equipped with what may be termed implements or tools — in the case of man, with hands, ears, feet, and so on. Each of these tools is a product of biological evolution, and the particular behavior of each is presumably co-ordinated in some way, first, with the activity of the mind, conscious or instinctive, and second with the activity of other tools. In respect to being a tool of defense and aggression whose behavior is co-ordinated with the behavior of other tools, language is no exception. This view of language as a tool of behavior we shall find a more fruitful angle of departure for dynamic studies than the more usual view of language as an elaborate system of signalling and communication, though language is, of course, both.

The chief difference between language and many other tools of behavior, say a hand, is that language is primarily social in its use while the behavior of the hand is primarily individualistic or non-social. The occurrence of speech generally presupposes some second person who stands in some relationship to the speaker's problems and their solution; the behavior of the hand is usually more immediate in its effectiveness, and generally attempts to solve the individual's problems without recourse to another person. If acts of the hand (e.g. beckoning) can easily be discovered which are of a social nature, these are nevertheless more the exception than the rule. If, when a person talks or thinks over his problems by himself, his use of language is primarily individualistic, this function of language, however important, is by no means so important a function as language in its social use. The predominating social use of language is that which distinguishes the use of language from the behavior of the hand or of any other tool.

The analogy of language to the hand, though obviously

incomplete, is in many respects surprisingly appropriate. Yet the analogy is complete only if we compare the vocal organs that produce speech to the hand, or else the speech produced by the vocal organs to the activity of the hand, or, if one will, the total phenomenon of vocal organs in activity to the total phenomenon of hand in activity. No matter in which of these ways the analogy is stated, the two tools have this in common: each is a tool in use, and the use of each tool is attended by some degree of purpose, insight, intelligence, and experience. With this analogy of the hand in mind let us turn to the problem of measurement.

b. The Problem of Measuring Behavior

Until some means has been devised for measuring the phenomena of a given field, one can neither make of that field an exact science nor study the dynamics of the field with any mentionable degree of precision. Hence the discovery of a method suitable for measuring the chief phenomena of speech is of immediate concern to Dynamic Philology. It is at this point — in the quest of a measuring rod for speech — that the analogy of the hand to the vocal organs and language will be helpful. For, instead of inquiring how language may best be measured, let us ask how one would measure the hand. By considering the hand before we consider the vocal apparatus we shall gain a welcome objectivity as well as a refreshing liberation from the numerous small prejudices and biases which have colored and distorted our views on language from earliest school-days, and which frequently becloud the fundamental problems at issue.

How, then, would one measure a hand? As to the physical measurements of the hand, one might, by the judicious employment of customary methods, obtain a fairly accurate knowledge of the hand's volume, mean temperature, weight,

area, dimensions, and the like. Yet, however accurate these physical measurements might be, they would yield quite as inadequate an idea of the total phenomenon of the hand in action as would similar measurements of the vocal organs give of the total phenomenon of speech. A mere physical measurement of the hand would provide no indication of the numerous aggressive and defensive gestures of which the hand is capable and for the sake of which the hand presumably exists. The chief task in measuring the entire phenomenon of the hand would, therefore, be to find a means of measuring all the significant acts of any given hand (and *mutatis mutandis* in measuring speech).

What is to be understood under the term 'significant acts of a hand' is merely a matter of definition. One might give the term a general meaning and call every act of the hand significant, whether the act fulfilled a need or not. Or one might limit the term and apply it only to acts of the hand, like pointing or beckoning, which are significant in a very literal sense, that is, which are signals or acts of communication. There is, however, a third definition which is neither so general as the first nor so narrow as the second, and which, in view of the analogy of a hand to the vocal organs, seems recommended: any act of the hand is significant if, directly or indirectly, it is useful for the satisfaction of a need. Hence, when the hand beckons, the act is significant; when the hand unlocks a door or lights a cigarette, the act is significant; but when, say, a person turns in his sleep and his hand accidentally slips over the edge of the bed, this act is probably not significant, for it seems to be in no way useful to the satisfaction of a need.

With this definition of a significant act, i.e. an act directly or indirectly useful in the satisfaction of a need, let us approach the general problem of measuring the significant acts of behavior. For convenience we may at times refer to these simply as acts of behavior, for the present study will not deal with any action of behavior which is not significant

in the sense of being directly or indirectly useful in the satisfaction of a need.

At least on one point it is possible to make with certainty an inclusive statement about the significant acts of any tool of behavior: the number of significant acts actually made by any tool, say the right hand of a given person, from birth to death is finite, and the kinds of these acts, though manifold, are limited. Hence if there is no other means of measuring the significant action of a tool of behavior, its acts could conceivably be counted and arranged among themselves according to the relative frequency of their occurrence over a reasonable period of time. Furthermore, with a reasonable degree of accuracy, it might be possible to determine whether a certain act is made over a given period of time more often than another. Such a system of measurement would comprehend all significant acts produced by any implement of behavior, linguistic or non-linguistic.

The several apparent insufficiencies of this system of measurement (i.e. statistics), which seems to consist of little more than mere counting, are familiar and deserve mention only to show that they cease to be of serious consequence when the acts of behavior to be measured are the gestures of the stream of speech.

The one general criticism of our contemplated system of measurement is that it entirely ignores in its objectivity the differences in intelligence, value, and experience evinced by the various acts of behavior. Everyone will rightly insist, moreover, that the qualities of intelligence, value, and experience are especially vital factors in speech-behavior. Nevertheless, in view of our present limited knowledge about the nature of these qualities, it seems a far more prudent procedure to select a measuring rod without any reference to these seemingly variable and highly elusive factors, than to attempt to devise one which will take them into consideration. The least that we may expect from the application of

our method is the establishment of a domain of speech-behavior where the disturbing effect of these elusive factors is negligible. And in addition there always remains the possibility (indeed, as we shall see, the strong probability) that the dynamics of these elusive factors may in turn be apprehended against the background of our statistics, and that ultimately their dynamic behavior may be measured quantitatively, if not directly, at least by ratios in so far as it motivates changes in other behavior that is measurable. In short, our method of statistical measurement may well prove itself of considerable service in studying objectively the otherwise highly subjective phenomena of meaning, value, and experience.

In addition to this general criticism of our method which we have just discussed and found unimportant in our case, there are several other secondary objections that we shall now only mention. For instance, the statistical method of measurement seems to ignore the palpable fact that most, if not all, acts of behavior are but parts of elaborate complexes of action in which the activities of other implements of behavior frequently come into play; many acts of behavior are truly meaningless when isolated from the whole into which they are co-ordinated. In the entire action of playing tennis, for example, the grip of the hand, though important, is by no means the only act, nor necessarily the most important act in the complete co-ordination. Furthermore, even if an isolation of the behavior of a single implement were permissible, there would still remain practical difficulties to hinder the successful employment of the method: (1) Every act of behavior may be viewed both as a complex of ever smaller acts, and as a component in ever larger complexes of action; we might well be in doubt as to the proper size to select as a unit. (2) Granted that the proper size of the unit were determinable, there would remain the problem of establishing criteria of comparison to determine how similar two acts of behavior must be before they

can be considered the same, and how dissimilar they must be before being classed as distinctly different. (3) There would finally remain the almost insuperable task of observing and recording all the gestures of a given implement of behavior without making self-conscious the person whose behavior was under consideration.

But these secondary objections just mentioned, however serious they might be if the method were applied to other acts of behavior, become of minimal consequence, indeed for practical purposes disappear, once the method is applied to the acts of speech. In now discussing the application of the statistical method to the phenomena of speech we shall in fact be forcibly reminded of the unusual advantages which the study of speech-dynamics possesses over the study of the dynamics of any other type of behavior, advantages which seem in many respects to be unique in the whole range of biological and psychological phenomena.

c. The Statistical Method When Applied to the Phenomena of Speech

The phenomena of speech which we wish to measure are not those represented by an extensive list of alphabetized words in a dictionary, nor those represented by pages of paradigms and syntactical rules in a grammar. They are rather the phenomena of speech in the process of being uttered; they represent the stream of speech that may appropriately be viewed as a succession or a continuum of communicative gestures, produced by the vocal organs occurring in arrangements that are essentially permutations.

If we view language as a continuum of gestures, many serious practical difficulties in the way of statistical measurement have already been solved for us. First of all, the general problem of labelling becomes minimal: so great is the rate of repetitiveness of most of the gestures that the

necessary variety of different labels is correspondingly small. Moreover, though actual variation is great in pitch, amplitude, timbre, and speed, there is nevertheless in most cases little doubt as to significant differences and similarities, and hence little doubt as to the suitable label of classification for a given speech-gesture. To devise a scheme for labelling the different gestures occurring in the stream of speech (which is the same as to devise a system of writing) is by no means an *a priori* impossibility. Furthermore, the observation and the recording of the gestures of the stream of speech, by use of these labels, without making unduly self-conscious the speaker under observation, appears never to have amounted to an insuperable obstacle in the past.

Indeed, skill in writing is so old and has been so much employed even in the remote past that we already possess an enormous body of recorded speech-gestures, which includes almost every type of speech, and which has been produced in the course of the centuries, unbiased by the needs of Dynamic Philology. If the labelling in this older material is at times not so precise in many respects as the comparative philologist might wish, it is unquestionably, even at its worst, far more accurate than could be devised for the acts of any other implement of behavior. Moreover, we are not bound, like the paleontologist, to records of the past. The dynamic philologist, with the help of phonology (see pages 54-58) may devise his own system of labelling, and may record his own speech, or the speech of his contemporaries; since the dynamic forces of language are presumably manifest in all speech, the selection of samples of language may be dictated at least to a considerable extent by the investigator's convenience.

Although many gestures of the stream of speech can be subdivided into subsidiary gestures and hence can be viewed as a sequence or sequences of smaller gestures (e.g. a sentence as a sequence of words which are in turn sequences of speech-sounds), this sequential nature of speech-gestures offers no

serious impediment to speech-labelling. For even the larger sequences of speech-gestures have often such a high rate of repetitiveness and stability in the stream of speech that many of them could be labelled as units in themselves if it were expedient. To illustrate, taking English as an example, we might first label each of the successive speech-sounds (i.e. *phonemes*, see page 49 ff.) by the use of a phonemic alphabet.¹ For example, the English word *untruthfulness* may be reviewed as a sequence of twelve phonemes, if one chooses to select the phoneme as a unit, i.e. *u-n-t-r-u-th-f-u-l-n-e-ss*. Or one may view the same word as a sequence of five units which we shall term *morphemes* (see pages 132 ff.), i.e. *un-tru-th-ful-ness*, and devise a morphemic alphabet² to label all the different morphemes (e.g. prefixes, roots, suffixes, and endings) of a language. Again one might anatomize the stream of speech into syllables,³ devising a label for each different syllable. Or one might anatomize the stream of speech into words in their full inflected form, and for each different word in full inflected form devise a special label,⁴ e.g. one for *boy*, one for *boys*, one for *man*, one for *men*. Naturally as one takes larger and larger sequences for units — phrases, clauses, sentences — variety increases with a concomitant diminution in the average rate of repetitiveness, to the general effect that an ever larger sample must be taken from the stream of speech before repetitions are sufficiently abundant to justify the application of statistical principles. Though the task of labelling and counting these larger sequences of gestures would doubtless be difficult in the extreme, it is by no means impossible.

It would, of course, be incorrect to imply that one would at no time be in any doubt as to how a speech-gesture should best be labelled. In many districts in America the pronunciation of *latter*, for example, is so similar to that of *ladder* that one may reasonably hesitate between the use of *t* or *d* in the labelling of the dental of *latter*. Yet doubtful forms of this sort are proportionately so rare in the stream of

speech that they are comparatively insignificant statistically, although, as we shall see (page 106 ff.), they do afford interesting problems to dynamic studies. If, from the point of view of the perfectionist, every gesture of the stream of speech cannot be labelled with perfect accuracy, nevertheless from the point of view of a biologist or psychologist investigating the significant action of any other tool of behavior, the gestures of speech must seem ideally suitable for labelling.

Likewise in respect to another general problem, the student of language is favored. As was observable from our previous analogy of the hand, the significant act of any one tool of behavior is frequently not merely sequential but also a part of some larger complex of gestures; thus the act of the hand, in gripping the tennis racket, is but a part of the total tennis stroke in the performance of which the behavior of many other members of the body take part. So, too, the stream of speech is often accompanied by gestures of other members (e.g. beckoning with the hand or winking with the eye). But though acts of other tools may accompany speech-gestures, they are in no wise an obligatory accompaniment of speech. The reason why speech is comparatively free from the necessity of concomitant acts of other tools of behavior is possibly because of the social nature of language. For, language is a medium for the young and the old, the halt and the blind, and one which must be serviceable in darkness as well as in daylight, in immediate proximity and over a considerable distance; its social utility would clearly be diminished were it encumbered with many other obligatory gestures. Such other acts of behavior as do accompany those of speech fall mainly into two classes: the constant and the random. The constant acts, such as the beating of the heart, the functioning of the liver, and the like, acts without which there would be no speech, can, because of the comparatively high degree of constancy in their behavior, be temporarily disregarded until more is

known about the peculiar structure and behavior of the stream of speech itself, even as the engineer in surveying a piece of land can with impunity disregard the constant rotation of the earth. The random acts, such as pointing and winking, though frequently important in speech, can be disregarded at present on the very grounds of their randomness. Of all the acts of human behavior the stream of speech alone seems to constitute a continuum which with the minimum of distortion can be isolated from the total background of behavior and at the same time be labelled and studied statistically with a high degree of accuracy.

Of course, after all is said, while it may be readily conceded that the stream of speech is a continuum of gestures which can be anatomized or dissected in a way entirely suitable for the application of statistical principles, nevertheless the belief is hard to combat that dissection of this sort annihilates the most significant and important aspects of language. For language is more than a continuum of gestures; it is a continuum of gestures in arrangement, and in an arrangement which is of vital importance for the conveyance of meaning and emotion. One feels instinctively that it is rather in the configurations of language than in the atoms that meaning and intensity lie, and that configurations do not seem to lend themselves to mere addition, subtraction, multiplication, and division. Yet the dynamic philologist in using the methods of statistical analysis does not for a moment ignore the existence nor the importance of configurational arrangement. On the contrary, his anatomization is to be viewed solely as a device whereby the structure and forces of configurational arrangement can be better approached. The dynamic philologist is in a position analogous to that of the chemist who anatomizes so that through analysis of the parts he may better comprehend the total phenomenon. The justification of our contemplated empirical analysis of the stream of speech into its parts will be, I hope, the synthesis of those parts again, not into the

stream of speech from which they were derived, but into the totality of a person's behavior of which the stream of speech is but a part; but this attempt at synthesis will first be undertaken (Chapter VI) after our analysis of the parts has been completed (in Chapters II-V).

3. PROSPECTUS

That the reader may at no time be confused in the ensuing empirical investigation of the dynamics of speech, it is perhaps expedient to enumerate in advance the major steps in the presentation. We shall, as suggested previously, analyze samples of the stream of speech of many languages into their component parts, we shall study the frequency distributions of these parts, and shall attempt to correlate these empirically observed phenomena with the significant phenomena of meaning, emotional intensity, and configurational arrangement. But we shall not investigate the frequency distributions of all the different speech-elements at once. We shall begin (Chapter II) by restricting our investigation to the form and behavior of words; thence we shall proceed (Chapter III) to a discussion of the smallest speech-unit, the phoneme (sometimes termed speech-sound); in Chapter IV we shall devote our attention to the morpheme (i.e. prefixes, roots, suffixes, and endings) and the syllable, with special emphasis upon the relationship between relative frequency and accent. With the accumulated evidences of the previous chapters we shall, in Chapter V, be in a position to study the dynamics of sentence structure in reference both to the question of relative frequency and to the question of meaning, emotional intensity, and configurational arrangement. At this point our investigation ceases to be primarily empirical, and in Chapter VI the attempt is made speculatively to comprehend the significance of all preceding findings in their relationship to the

totality of behavior. Since Chapter VI is largely speculative, it is hoped that the contents of that chapter will not be considered as on the same plane with the major portions of the preceding chapters in support of which data, empirically derived, are advanced. Since all linguistic phenomena appear to be closely interrelated, this investigation can probably be grasped only as a whole; as we progress from chapter to chapter, the accumulating evidence will strengthen what has gone before. That the reader may be informed of whither this investigation is proceeding, it may profitably be stated in advance — though the entire significance of the statement will be only later apparent — that all our data seem to point conclusively to two fundamental conditions present in all speech-elements or language-patterns: (1) whether viewed as a whole or in part, the form of all speech-elements or speech-patterns is intimately associated with their behavior, the one changing with the other, so that all seems to be relative and nothing absolute in linguistic expression; and (2) all speech-elements or language-patterns are impelled and directed in their behavior by a fundamental law of economy in which is the desire to maintain an equilibrium between form and behavior.