DOCUMENT RESUME

ED 123 917 FL 007 742

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TITLE Linguistic Method: Yesterday and Today.
PUB DATE 76
NOTE 18p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Diachronic Linguistics; *Language Research; *Linguistics; *Linguistic Theory; *Research Methodology; Semantics; Semiotics; Synchronic Linguistics
IDENTIFIERS *Linguistic Method

ABSTRACT

This paper introduces the reader to a brief history of the focus of linguistic method from prehistoric times, through the Classical era, the Middle Ages, to the present. The scientific orientation of linguistic method is exploited; a set of specific principles is found to unify most of today's diverse methods. The success of linguistics is attributed on the one hand to the fact that the discipline serves as an analogue to other sciences, the most recent and exciting case being genetics, viz., the DNA code. On the other hand, the subject matter of linguistics, language, is known to be the human act per se. Accordingly, it is considered that human communication remains distinct from animal communication. In an effort to uncover how language is the hallmark of mankind, linguistic method is turning to the laboratory sciences for insights into the composition and linguistic functions of the hemispheres of the brain, and to philosophy, of which certain schools claim language as their proper object. In particular, the recent rediscovery of semantics leads the linguist to semiotics. Linguistic method today has progressed to the status of a well-established, independent discipline which can now enjoy the advantages of the integration of cross-disciplinary discoveries, humanistic as well as scientific. (Author)

Linguistic Method: Yesterday and Today*

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Linguistics today enjoys an active and prestigious position in the world of learning. We wonder why it does not reflect the maladies of a time-worn discipline, inasmuch as it can be argued that man's focus on language is coterminous with his own appearance, and that this focus is traceable through ancient cultures down to the present.

Thus consider in Genesis, for example, the naming of the animals by Adam; or the Chinese notion that a divine turtle with marks on its back is the originator of writing. These legends on the origin of language tend to be supernaturally oriented. The Egyptians had their god Thoth as the originator of language, the Babylonians Nabû, and we are well aware of the nature of taboo integral to this feeling of language. Here, linguistics overlaps with such disciplines as anthropology and sociology.

We can attempt to stay within the domain of pure linguistics in tracing the ancient paths of the discipline, but we find that it is inextricably woven together with other fields, in particular philosophy. For the classical grammarians, language served as a vehicle for uncovering the general laws which govern human thought. For the Greek

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* The present paper is a further development of Rauch 1976.

and Roman philosophers, logical distinctions served as the basis for classifying the elements of language. Plato made the distinction between noun and verb and, as we know, classified adjectives with verbs, since both the verb and the adjective make a statement about the subject. Nor can we forget the grammar of Sanskrit composed by Pāṇini in the fourth century BC, which consisted of some 4000 aphoristic statements treating phonology, grammar, method, and theory.

The philosophizing about language persisted through the first millennium, into the Middle Ages, and past the Renaissance. There was thought to be a universal grammar underlying all languages, a universal base determined by human reason, and not at all by the differing structural systems found in the differing languages. This notion is reminiscent of the Ancients who tried to formulate a general grammar on a purely logical basis. Other emphases in language study, such as normalized grammar and value judgments about vernaculars, coexisted during the rationalistic period. Nonetheless, the search for a universal base has continued to the present time. Thus it is that today Chomsky sees linguistics as essentially a discipline which seeks to further our understanding of the human mind.

The establishment of a universal base is certainly a respectable enterprise; what can be questionable is the procedure used in postulating a universal. In earlier times a universal grammar was formulated not at all on the evidence of various languages, but by the application of a series of dogmatic assumptions about the nature of language. Leibniz (+ 1716) was one of the first to point out the error of this

procedure and to show the need for a comparative study of languages based on linguistic data, thus introducing the empirical as well as the comparative orientation which is the hallmark of nineteenth century linguistics.

Assuming then that the study of language is very old, we recognize that linguistics profits from a wealth of cumulative knowledge. It can, however, be argued that the roots of modern linguistics are little more than one and one-half centuries old, if we consider nineteenth century linguistics to be the point of departure. But the arguments for or against its age are not mutually exclusive; nor do they provide direct explanations for the healthy, thriving state in which we find linguistics. It is in the enviable position of serving as an analogue to the other sciences. In fact, history tells us that evolutionary explanations in linguistics preceded those in biology by half a century. Thus it is that Darwin in his Descent of Man (1871) gives credit to the work of 'philologists:'

Let us consider the most recent analogue of linguistics to science: It is probably the most spectacular of all time, namely the breaking of the code of the basic matter of all living things, DNA. Although within three years after the pioneer work of Mendel in genetics (about 1869), nucleic acid had been isolated from protein in a cell, it was not until the twentieth century that scientists began to understand its chemical structure. Well into the first half of the twentieth century, protein was still posited as the basic stuff of life. Webster's third new international dictonary (1964) continues to define the gene as 'self-perpetuating protein molecules....serving as specific transmitters of hereditary characters.'

Proof that the DNA of the nucleus of the cell rather than the amino acid of the protein in the cytoplasm of the cell transmits the directions for the making of an organism came only in the early Fifties. This was followed by a mushrooming of research which uncovered the structure of DNA and led to the breaking of the code inherent in that structure. Briefly the structure is as follows: The nucleus of a cell contains chromosomes. Chromosomes are thread-like bodies, stripes or bands of genes arranged in a linear sequence. A gene is a segment of DNA molecule. A human DNA molecule has in it over 200,000 nucleotides. A nucleotide consists of one of the four DNA bases (Adenine, Guanine, Thymine, Cystosine), one molecule of sugar, and one phosphate group. The four bases link to each other in a strand or chain. There are two such strands to a segment of DNA. They form a helix, i.e. they are like the threads of a screw, but they are going in opposite directions, one up, one down. The four bases in the strands are paired, T always with A, G with C; as a result the two strands of which they are a part are paired. Thus, if the hydrogen bonds holding the two strands were to break, the strands unwind; the bases then pick up their proper partner (A with T, C with G) from the raw material in the cell, and accordingly the double stranded DNA has replicated itself.

Let us now consider the code: The DNA is in the nucleus of a cell; it is the blueprint for an organism. It has to transfer this blueprint onto the proteins in order to actuate the blueprint, the plans. RNA, a second type of nucleic acid, attaches and models itself to an unwound strand of DNA, thereby taking on the blueprint of the DNA. The RNA strand carrying the DNA message then breaks away from the DNA strand, leaves the nucleus, and enters the cytoplasm.

In the cytoplasm are the amino acids which are the building blocks of the protein. To speed the relaying of the blueprint, there are in the cytoplasm mobile molecules of RNA, exact replicas of the messenger RNA sections. The amino acids hook to these replica or transfer RNA, which then position themselves onto the messenger RNA strand. The blueprint is thus transferred from the messenger RNA to the amino acid. There are twenty amino acids but only four RNA bases. The correlation is three bases to each amino acid; the possibility is accordingly four to the third power number of arrangements of the three bases. This amounts to a possible 64 word vocabulary which easily covers the twenty amino acids. Words are left over, carrying instructions for protein synthesis, such as signals for start and stop.

The 64 possible words which constitute the DNA language are each composed of three discrete letters. The letters are in continuous linear sequence and the message is intact as long as they form a syntagm of threes. The code is scrambled if less or more than three letters are added or subtracted; it is brought back into phase but mutated by the addition or deletion of threes or multiples of threes. A three letter DNA word should order its letters in an exact sequence so that it may be meaningful, just as the C U P of English cup only makes sense in that order. The deciphering of the triplet sequences of DNAese into chemical language suggests that some paraphrase or synonymic relationships may exist. This is the case when several code words specify the same amino acid.

In concluding this insight into DNAese, we quote from Beadle and Beadle (1967:216): '...the deciphering of the DNA code has revealed our possession of a language much older than hieroglyphics, a language

as old as life itself, a language that is the most living language of all--even if its letters are invisible and its words are buried deep in the cells of our bodies.'

This excursus into genetics, with its recently discovered analogue to linguistics, assures us that the discipline of linguistics is indeed vigorous; it is fast-moving, marked by definite methods, a relatively endless store of data, and rather continuous success. Admittedly, scientific method, characterized by such features as intellectual uncertainty and curiosity, data selection and judgment, hypothesis formation and testing, and hypothesis reapplication or modification, provides a most secure as well as eminent operating procedure for the linguist; yet he shares this procedure with other men of science. Quite obviously, we look then to the subject matter itself of linguistics--language, a fundamental human activity. It is, however, quite another step to the spectacular realization that language is not just a feature of human behavior, but that it is to be isolated as the human act per se. Thus the object of linguistic science is the most fundamental act of human behavior. Further, the object is studied by a method which was successful in constructing a scientific theory of an aspect of human behavior. Let us now look at the method of linguistics. This will in turn lead us full circle to the fact that language is the human act per se.

Method, or methodology, is a discipline in its own right, one which studies the principles peculiar to a particular science, art, or other branch of knowledge. Within linguistics, the special principles characterizing each competing school in modern times are adhered to with an absolute conviction and vigor of persuasion, possibly unequaled by former

eras in the history of language investigation. Typically one method dominates by a breakthrough or breakthroughs effecting an irreversible development in the history of the discipline. The propaganda, iconoclasm, attacks and counter-attacks, often acrimonious and long-lived, are somewhat understandable from the human viewpoint, but they cannot eradicate the breakthroughs of successive schools, nor can they diminish those linguistic principles which withstand the test of time. The axis of linguistic method is ever shifting, perhaps the evolving pivot is the one which seeks to explain language as the hallmark of mankind. At present such a focus has not been achieved, although it appears to be in the process of development, as we discuss below.

Let us consider some of the principles which are fundamental to linguistic methodology and which are thus shared by several schools of linguistics. These principles give us an insight into what the discipline of linguistics <u>is</u> and <u>does</u>. Together with these basic principles we will discuss some common misconceptions. Whether we consider today's linguistics relatively young or relatively old, one of the fundamental principles common to present methods is the structural principle, which holds that a linguistic element is to be analyzed as integral to a system: To be, is to be related. A structure consists of elements having a certain mutual relationship as opposed to a mere accumulation of mutually independent items; the latter is known as linguistic atomism. Pāṇini, the Indic grammarian of the fourth century BC was definitely a structuralist; Jakob Grimm, in systematizing the evidence for the First Sound Shift, did so through the use of the structural principle. We know, too, that Noam Chomsky, the premier name in current linguistics,

is a structuralist. In fact, it is difficult to conceive of a modern approach which is not structural. We are well aware that the Prague school is to be credited with formulating a consistent theory of linguistic structuralism, but we tend to be misled by the equation of Neo-Bloomfieldian taxonomy with American structuralism per se.

Similarly, our terminology in discussing various methods is deceptive with regard to the term 'descriptive'; as with the term 'structural' the term descriptive is properly non-school associated. Thus, a phase of the methods of both the Transformationalist and the Classical Phonemicist, for example, consists in the structural description of a language, whether that language be prehistoric, historic, or contemporary. Structural and descriptive as applied to linguistics are then incorrectly delimited, when they are meant to mark the American pre-transformational approach toward contemporary language. (Witness Chomsky's three levels of adequacy: observational, descriptive, and explanatory).

Let us note yet among these misconceptions the charge that unfinished or piecemeal description is peculiar to the Transformationalist. It is unlikely that any method, regardless of its orientation, can substantiate exhaustive or complete structural treatment of a language. We may actually deduce descriptive endlessness as universal for linguistic method. We have pointed out that in our time the primary linguistic approaches to any language are all structural, all descriptive, and all incomplete. In the long run terminological and conceptual misapplications create non-problems. Immediately, however, they are time-consuming; eventually they tend to be sloughed off by linguistic method itself.

Now let us proceed to a second principle. Inherent in the structural principle is the principle of minimal opposition, both as a linguistic unit and a linguistic relationship. The ability of linguistic method to identify distinctive language features is a major factor in its success as a science among related sciences. Here linguistics clearly functions as a hard science; it reduces data to discrete elements. Presently, certain facts of phonology are readily scrutable in the acoustics, physics, or physiology laboratories, for instance. Accordingly, the linguistic scientist is secure in the physical reality of some phonological material. Other less tangible and intangible aspects of phonology, for example, predictive phonology, as well as many facets of semantics, elude the current tools of the linguist qua laboratory scientist. This is not to imply, however, that laboratory linguistics is an ultimate goal, since the study of language is not pure science alone, as we note further below.

Let us look now at two additional principles: Intrinsic to the structural principle and the principle of minimal opposition is the principle of simplicity. It is frequently represented in scientific method by the principle of 'Occam's Razor,' which holds that entities should not be multiplied unnecessarily. Considering the many types of simplicity which play a role in linguistic method, it is interesting that the specific type of simplicity which implies generality is a constituent of most linguistic approaches. We are thus able to recognize a principle of generalization in the Neogrammarian hypothesis as well as in the emicization of Classical Phonemics or Taxonomy. We are familiar with the dictum of the Neogrammarians that sound changes admit

of no exceptions, and a sample of emicization familiar to all Germanists is Old High German umlaut where massive umlaut takes place upon the merger of the umlaut of a with old e, or upon the loss of the umlaut conditioner. It is clear that both Neogrammarian law and the emicization are abstracted constructs which account for some observed and non-observed data of a particular set, but usually not all such data. To be sure, the explicit formulation of a significant generalization is one of the foremost aims of the Transformational approach. However, a generalization is significant only if it can account for the empirical data. Thus, applying this principle to the Old High German umlaut problem, for example, the Generativist does not accept wholesale umlaut, but only those umlauts observed in the concrete data. In this wise he requires reality in his generalization as opposed to abstraction. Further, the Generativist does not seek to verify a generalization by repetition or accumulation of data, but by confirming evidence from diverse domains. Transformational method is essentially self-evaluative, challenging its own ideas by adducing argument and counter-argument through rigorous reasoning. In this respect it demonstrates some of the fundamental techniques of scientific method.

Presently one of the principal concerns of linguistic method is the abstraction: concretion dichotomy in linguistic descriptions. Thus we are led to ask whether the principle of minimal opposition, for instance, is violated by admitting the notion of continuum into linguistic method. It is what Bolinger calls 'gradience;' it may be called 'degree grammar', but 'non-discrete grammar' is probably a misnomer." It is a fact that human linguistic behavior, pragmatically determined

(performance) proceeds in a continuum. We have always realized this; witness our understanding of dialect and idiolect. However, in recent times linguistic method has dwelt on polarization of a linguist's attitude toward his data; whence abstract versus concrete, discrete versus continuous, and Markovian versus global descriptions. In the distant future we may well view this polarization as one of those pseudo-problems we mentioned above. There is no escaping the fact (and this is why 'non-discrete grammar' is a misnomer) that a discrete element cannot become non-discrete without scrambling the code. We are reminded of the DNA genetic code where change in a code takes place not by change in discrete elements, but by the addition or deletion of discrete elements. So, for example, the Indo-European vowels are [+ vocalic], the consonants are [+ consonantal], and the resonants are [+ vocalic + consonantal], but in the code which is in phase, that is, not scrambled, the resonants must be either the discrete element [consonantal] or the discrete element [vocalic]. Grammar is thus both discrete and continuous, as witnessed in the complementary, not the antagonistic, principles of minimal opposition and generalization, respectively. Grammar is semi-continuous.

Let us recapitulate: We have said that linguistics studies language and that language is the human act per se. We have provided insight into the successful methodology of linguistics by looking at four principles which lie at the heart of the discipline and account to an extent for its success among related disciplines. We have shown that these principles actually are common to several current approaches to linguistics; in effect, they unify linguistic progress. Yet, it appears

that linguistic method itself can engender the noxious by-product of false division. For example, the principle of minimal opposition has trained the linguist to analyze his cosmos to a large extent binarily. In like manner, the inclination to study linguistic method (or the discipline of linguistics) by charting the principles of various schools on a plus-minus feature grid seems quite natural, although rather insipid in view of the recent rediscovery by linguistics of the provocative phenomena involved in semantics.

We are all well aware of the prejudice in the relatively recent history of the discipline against semantics. Practically speaking, all schools of structural linguistics have failed to develop the relevant correlation between the features of language and the features of society and culture. Language used for communication and contact with others requires not just an acceptable knowledge of the graphemic, phonemic, grammatical structure of a language, but an acquaintance with the semantic structure and with the concepts and ideas which are the expression of a contact. Not long ago linguistic structuralism opened its doors to semantics. In fact, the study of semantics and the third member of the semiotic triad, pragmatics, in turn opens the door irrevocably to an entirely new set of concerns which should engage all linguistic approaches. We are witnessing a return to the study of language and thought. This compels the linguist to look, on the one hand, to the laboratory sciences for insights into the composition and linguistic functions of the hemispheres of the brain. On the other hand, the probings of linguists resemble ever more the contentions of philosophy; understandably so, several schools of philosophy claim language as their principal subject matter.

Let us consider briefly the first evolving direction, namely, study of the linguistic functions of the brain. In 1968 Geschwind and Levitsky at Boston University discovered the so-called language lump or enlargement on the left side of the brain (upon examining hundreds of brains post-mortem.) This lump occurs in that part of the brain actually pinpointed by Wernicke in the last century as involved in the higher analysis of speech sounds. Identification of this brain region does not tell us the 'how' of language, but it is at least a starting point. Brain damage, perhaps with resulting aphasia, and the effects of electrical stimulation during brain surgery are prime sources of information. Three areas, identified in the left brain hemisphere and called 'ideational,' are concerned with the content and meaning of language, as opposed to the motor strip which handles voice control. Damage to the motor strip is less harmful and its effects (e.g. slurred speech) are temporary, provided the corresponding area in the right hemisphere is unharmed, while damage to an 'ideational' section ranges from short term aphasia to permanent loss of speech.

It is known that the brain mechanism for the perception of the sounds of music is different from the brain mechanism for the perception, for example, of Eng. tip versus dip. Witness the Russian composer Shebalin, who suffered a stroke on his left side, prohibiting his understanding of speech, yet he continued to compose music; the latter ability is known to be a function of the right hemisphere, which controls creative processes. Lenneberg (1964) has found that language and intelligence are not commensurate; they are independent traits. Language begins in the same manner in retardates as in normal children; further, the rate of development of speech in normal children differs

little from that in normal children of deaf parents. Lenneberg rejects the notion that man's ability to speak is due to such factors as an increase in intelligence or an increase in the weight of the brain. We return once more to the fact that language is a species-specific, biological capacity of homo sapiens.

Although we are quite certain that language is the human act per se, studies dealing with animal communication continually refine our concepts of human language. Hockett's well known thirteen characteristics defining at least one kind of animal communication relegate four (displacement, productivity, cultural transmission, duality of patterning) to human language alone. The now famous Gardner chimpanzee, Washoe, whose repertoire was determined at 3.25×10^6 sentences, has been superseded by Gould's study on the repertoire of the bee dance at 4×10^7 discrete sentences (Gould 1975). As recently as last October in the journal Science (Kuhl and Miller 1975), we learn that chinchillas are able to distinguish between voiced and voiceless initial dental stops. We are reminded of the fact, mentioned above, that in the human brain the left temporal lobe enables us to distinguish dip from tip. But we also hasten to note that although animal can distinguish voicing of initial stops, as can man, animal does so purely through the mechanism of stimulus-response. Thus language as we understand it remains peculiarly human.

On the other hand, the return to the study of language and thought, prompted by the rediscovery of semantics, is leading the linguist ever more, as stated above, in the direction of philosophy. Language is the only way of communicating, that is, of relaying signals through an ordinary expression code. It is a way of thinking, of systematically arranging

a content, and, as a matter of fact, the only way to do so. Little wonder that the philosopher Carnap believes that any questions of philosophy, when real at all, are questions of language. Semantics-pragmatics leads the linguist directly to the contemporary philosophical school of Conceptual Analysis, which has alternately been called 'Linguistic Philosophy.' One contributor to Conceptual Analysis, J. L. Austin, brands his particular approach 'Linguistic Phenomenology.' Strictly speaking, the schools of Phenomenology and Conceptual Analysis are distinct philosophies, since they study man's personal experience in association with other humans (societal state) and man's personal experience in communication with other humans (linguistic state), respectively.

All natural languages are in essence pragmatic languages, which means that communication in natural languages depends on linguistic co-text, that is, any utterances that may have preceded the utterance under study, and extra-linguistic setting, that is, the general setting in which the utterance takes place, including the emotional and psychological status of the participants. In Communication Theory pragmatic factors are understood in terms of channels, and it is believed that communication proceeds in several channels simultaneously. Thus pragmatics deals (to use a binary classification) quite concretely with the users of language and their conditions of communication, while semantics is abstract and deals with language relative to the world at large.

Pragmatism connects to the theory of signs through the theory of interpretants. This is, of course, the semiotic of Charles Peirce. Let us take just a fleeting glance at this final direction of linguistic method today: An interpretant is in effect produced on someone (an

interpreter) by a sign. Peirce establishes three divisions of signs: icon, index, symbol, which express so-called 'firstness, secondness, or thirdness', respectively. The linguistic sign is a symbol, since it is arbitrary and requires the mind to relate it to an object. A symbol has thirdness, that is, it habitually or conventionally represents or draws an association of a particular object to the mind. Then, in effect, the interpretant, which constitutes the meaning of a symbol is habit. Habit cannot be accomplished merely from the theory of signs, but requires that one know what the intended purpose of the sign-user is, that is, the circumstances in which the habit is applicable. Here then, the theory of signs can link with pragmatism.

In concluding, we recall that it was the aim of the nineteenth century linguists to establish linguistics as an independent discipline. This was surely achieved through its scientific orientation and in particular through its structural method. It is clear that linguistic method today has progressed to the status of a well-established, independent discipline; the principles of linguistic methodology are inviolable. Accordingly, linguistics can now afford to enjoy the advantages of the integration of cross-disciplinary discoveries, humanistic as well as scientific.

When we undertake to consider the language of man, who is capable of reflection, of developing and preserving a value system, and of projecting into the future, we undertake to comprehend man's unique position in evolution. From this focal point, linguistic method is only in its infancy; new principles await discovery without a necessary abandonment of the old ones. We in fact have no choice: The study of language cannot retrogress; it is integral to the irreversible evolutionary dynamism which is the ever heightened consciousness of man.

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