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MENTALISM IN LINGUISTICS*

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Linguists who conceive of their science as a discipline which collects utterances and classifies their parts often pride themselves on their freedom from mentalism. But freedom from mentalism is an inherent feature of the taxonomic conception of linguistics, for, according to this conception, a linguist starts his investigation with observable physical events and at no stage imports anything else.

We may expand on this inherent freedom from mentalistic commitment as follows. Utterances are stretches of physical sound. Since the primary data for a taxonomic linguistic investigation is a set of utterances elicited from informants or obtained from texts, the linguist begins with observable physical events, sounds or inscriptions. At the first stage of classification—the cataloguing of phonemes on the basis of these stretches of sound or some grouping of them—the linguist erects classes of significant sounds. At the next stage he forms classes of sequences of phonemes, thus producing a catalog of the morphemes of the language. Finally he classifies sequences of morphemes as sentential constituents of various types. Even if at some point the linguist should also consider an aspect of the speaker himself (such as his intuitive judgments about well-formedness) or an aspect of the speaker's environment (such as what he is referring to), such consideration is restricted to just those aspects that are capable of being observed by anyone who cares to carry out the same investigation. Therefore, on the taxonomic conception of linguistics, there is nowhere from the beginning to the end of a linguistic investigation, any appeal to mental capacities or mental processes. Alternatively, the taxonomic conception is a very narrow form of reductionism, which holds that every linguistic construction, at any level, reduces ultimately, by purely classificational procedures, to physical segments of utterances.

This philosophy of linguistics is never explicitly defended in current literature, because the linguists who hold it generally assume that Bloomfield long ago conclusively refuted mentalism.[1] Hence a taxonomic linguist considers it unnec-

[1] For obvious reasons, Bloomfield's own version of Bloomfieldian antimentalism is taken as my point of departure. But I could just as easily have taken any one of the many antimentalist positions found in the tradition of American behaviorist linguistics—for instance, with Twaddell's view of the psychological reality of linguistic concepts as expressed in his influential paper *On defining the phoneme = Language monographs* no. 16 (1935). There Twaddell writes:
'It is a work of supererogation to try to restate what Bloomfield has so well stated. For the

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essary to put forth arguments of his own against this doctrine. When he criticizes other linguists for subscribing to a mentalistic philosophy of linguistics or for adopting a mentalistic theory of linguistic structure, he relies on Bloomfield's critique of mentalism for support.

But when we look at Bloomfield's critique of mentalism and compare the doctrine he criticized with the doctrines that modern taxonomic linguists criticize for being mentalistic, we find, curiously enough, that the most influential of the latter turn out not to be the kind of doctrine that Bloomfield attacked. Bloomfield criticized, not mentalism in the contemporary sense of this term, but a highly theologized conception of mentalism, which very few who regard themselves as mentalists would have any desire to call their own. Typical of Bloomfield's criticism of mentalism is this:[2]

> The *mentalistic* theory ... supposes that the variability of human conduct is due to the interference of some non-physical factor, a *spirit* or *will* or *mind* ... that is present in every human being. This spirit, according to the mentalistic view, is entirely different from material things and accordingly follows some other kind of causation or perhaps none at all.

Here and in similar statements, Bloomfield makes it clear that he is criticizing mentalism because it renders prediction and explanation of linguistic behavior in terms of causal laws completely impossible. Since Bloomfield's critique applies only to a theologized version of mentalism, it follows that taxonomic linguists are not justified in appealing to Bloomfield's 'refutation' to support their criticism of a version of mentalism according to which mental capacities and processes are subject to causal laws. Indeed, such a version of mentalism is wholly compatible with the doctrine Bloomfield called 'mechanism'.

There is, however, another feature of Bloomfield's discussion of mentalism which, though it can hardly be construed as a refutation of anything, does provide the taxonomic linguist with some basis in Bloomfield's work for his polemic against a nontheological version of mentalism. This feature is Bloomfield's endorsement of the empiricist viewpoint on scientific methodology. In this vein, he writes,[3]

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sake of completeness, though, it may be justifiable to recapitulate the general principles which invalidate any "mental" definition of the phoneme.

'Such a definition is invalid because (1) we have no right to guess about the linguistic workings of an inaccessible "mind", and (2) we can secure no advantage from such guesses. The linguistic processes of the "mind" as such are quite simply unobservable; and introspection about linguistic processes is notoriously a fire in a wooden stove. Our only information about the "mind" is derived from the behavior of the individual whom it inhabits. To interpret that behavior in terms of "mind" is to commit the logical fallacy of "explaining" a fact of unknown cause by giving that unknown cause a name, and then citing the name x as the cause of the fact. "Mind" is indeed a summation of such x's, unknown causes of human behavior.'

Other particularly explicit statements of the antimentalist viewpoint against which I intend to argue include C. F. Hockett, 'Biophysics, linguistics, and the unity of science', *American scientist* 1948. 558–72; and a work as recent as R. M. W. Dixon, *Linguistic science and logic* (The Hague, 1963).

[2] L. Bloomfield, *Language* 32 (New York, 1933).

[3] Bloomfield, 'Linguistic aspects of science', *International encyclopedia of unified science* 1.231 (Chicago, 1938).

... we can distinguish science from other phases of human activity by agreeing that science shall deal only with events that are accessible in their time and place to any and all observers (strict *behaviorism*) or only with events that are placed in coordinates of time and space (*mechanism*), or that science shall employ only such initial statements and predictions as lead to definite handling operations (*operationalism*), or only terms such as are derivable by rigid definition (*physicalism*).

The charge against mentalism made by those who cite Bloomfield in support of their dismissal of mentalism, then, is that mentalistic theories deal with events that do not meet the methodological demands of behaviorism, mechanism, operationalism, and physicalism. They believe the charge to be justified because they believe that a theory of linguistic structure which deals with such events is based on bad scientific methodology.

It is extremely important to note that Bloomfield goes on to say,[4]

... These several formulations [behaviorism, mechanism, operationalism, and physicalism], independently reached by different scientists, all lead to the same delimitation, and this delimitation does not restrict the subject matter of science but rather characterizes its method.

Bloomfield is here at pains to stress that the empiricist viewpoint on scientific methodology does not restrict the range or kind of phenomena that a scientist can describe and explain. The present paper denies just this claim. Against it, I argue two points. First, the taxonomic linguist's criticism of mentalistic theories for being based on bad scientific methodology fails through the inadequacy of the empiricist viewpoint on which it depends. That is, I shall argue that the empiricist viewpoint does not deserve to be the standard by which any conception of linguistics or any other science is judged. Second, a mentalistic theory is better than a taxonomic one because the delimitation imposed by the empiricist viewpoint, and accepted by taxonomic linguists, so severely restricts the character of a taxonomic theory that the range and kind of linguistic phenomena for which such a theory can account is considerably narrower than the range and kind that a mentalistic theory can handle. If these two points are both established, there should be an end to the criticizing of linguistic theories for being mentalistic; and, more significantly, there should be an end to taxonomic theories themselves.

One may formulate the controversy between taxonomic linguistics and mentalistic linguistics in terms of the following opposition. The linguist who adopts a causal conception of mentalism is contending that purely linguistic theories cannot succeed in predicting and explaining the facts of linguistic performance without making reference to the mental events, capacities, and processes of speakers, i.e. that linguistic theories must contain concepts which enable linguists to formulate the principles of mental operation that underlie speech. On the other hand, the linguist who adopts the taxonomic conception of linguistics is contending that purely linguistic theories can succeed in predicting and explaining the facts of linguistic performance.

It might appear that there is no way to settle this controversy short of some

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[4] Ibid. 231.

abstruse examination of the philosophical principles underlying the taxonomic and mentalistic positions, but this is false. The dispute can be settled simply by determining whether a taxonomic or a mentalistic theory is, in principle, better able to account for what is known about the general facts of linguistic phenomena. This determination can be made by showing that a mentalistic theory accounts for everything that a taxonomic theory accounts for, and, in addition and with no extension of the theory, for many things that the taxonomic theory must fail to account for. This is the spirit of Chomsky's criticisms of theories of grammar constructed within the taxonomic framework.[5] Unfortunately, Chomsky's arguments are often not taken in this way but are taken rather as trying to establish a new kind of taxonomic system.

The basic point of Chomsky's criticisms is that the failure of a taxonomic theory to handle the full range of facts about linguistic structure is due to the failure of such theories to concern themselves with mental capacities, events, and processes. The point which has been missed by those who interpret his arguments as trying to establish a new kind of taxonomic system is that only by introducing mentalistic concepts into our theories do we provide ourselves with the conceptual machinery which makes it possible to account for the full range of linguistic facts.

The general form of Chomsky's criticism of taxonomic linguistics is summarized as follows. The best kind of theory is one which systematizes the widest range of facts; hence a mentalistic theory is better than a taxonomic one because the former can handle any fact that the latter can handle, whereas the latter is unable to handle many kinds of facts that the former handles easily and naturally. The difference in the facts that these theories can handle is a direct function of the difference in the conceptual machinery they contain.

If it is to be shown that mentalism thus succeeds where taxonomic linguistics fails, it will be necessary to clarify certain features of the mentalist conception of linguistic theories. In particular, it must be made clear just what a mentalist means when he says that reference to mental states is a necessary aspect of any adequate linguistic theory, and just what status he intends mentalistic concepts to have. Unless his meaning is clarified, it will remain unclear whether it is the reference to mental states that is responsible for the margin of explanatory power by which mentalistic theories excel taxonomic theories. Unless the status of his concepts is clarified, it will remain open for the taxonomic linguist to claim that, although the mentalist says that his reference to mental states is a reference to things or events within the causal realm, the actual way in which this reference is made gives no clue how mental states might stand as causal antecedents of physical events like vocalization and speech sounds. These matters must be clarified in such a way that those who construe Chomsky's arguments as seeking to establish a new kind of taxonomic system cannot claim that the machinery in Chomsky's theories which produce the margin of explanatory power by which

[5] Cf. N. Chomsky, 'A transformational approach to syntax' and 'Current issues in linguistic theory', *The structure of language: Readings in the philosophy of language*, ed. by J. Fodor and J. J. Katz (Englewood Cliffs, N. J., 1964).

they are more empirically successful have no psychological reality but are merely new kinds of data-cataloguing devices.

First, how can mental events like those referred to in mentalistic linguistic theories be links in the causal chain that contains also vocalizations and sound waves? To explain how speakers are able to communicate in their language, the mentalist hypothesizes that, underlying a speaker's ability to communicate, there is a highly complex mechanism which is essentially the same as that underlying the linguistic ability of other speakers. He thus views the process of linguistic communication as one in which such mechanisms operate to encode and decode verbal messages. The aim of theory construction in linguistics is taken to be the formulation of a theory that reveals the structure of this mechanism and explains the facts of linguistic communication by showing them to be behavioral consequences of the operation of a mechanism with just the structure that the formulated theory attributes to it.

The step of hypothesizing such a mechanism in the process of theory construction in linguistics is no different from hypothetical postulation in theory construction in any other branch of science where some component of the system about which we wish to gain understanding is inaccessible to observation. The linguist can no more look into the head of a fluent speaker than a physicist can directly observe photons or a biologist directly inspect the evolutionary events that produced the human species. The linguist, like the physicist and biologist, can only achieve scientific understanding by constructing a model of the system which contains a hypothesis about the structure of the components of the system that are not observable. If the logical consequences of the model match the observable behavior of the system and would not do so without the hypothesis, the scientist may say that this hypothesis accounts for the behavior of the system in terms of the behavior of the unobservable but causally efficient component. If the model is the simplest one which enables the scientist to derive all the known facts and predict previously unknown ones as effects of the hypothesized component, he can assert that his model correctly pictures the structure of the system and its unobservable components. In this way, a linguist can assert that his theory correctly represents the structure of the mechanism underlying the speaker's ability to communicate with other speakers.

This mechanism is, according to the mentalist linguist, a brain mechanism, a component of a neural system. It is inaccessible to observation in the sense that, even if the linguist could look inside a speaker's head, he would be unable to figure out the structure of the mechanism from the electrochemical events going on there. But, as I have just pointed out, this limitation does not doom the linguist's program of discovering the nature of the speaker's ability to communicate in language. Hence it cannot be taken as grounds for supposing that a linguistic theory is not about a brain mechanism and its concepts are not about mental states. It is perhaps because, from the behaviorist viewpoint, this observational inaccessibility of the neural mechanism represents the boundary of the subject matter of linguistics, that taxonomic linguists have denied that theoretical concepts in a linguistic theory can have psychological reality. It would cer-

tainly explain why they have confined themselves to the corpus of elicitable utterances, behavioral responses to such utterances, and observable features of the context in which utterances occur, and why they have refused to regard the internal psychological properties of speakers as part of the subject matter of a linguistic theory.

Of course, the view that the reality of theoretical concepts in linguistics is mentalistic yet (in principle) irreducible to brain states, is a form of psychophysical dualism that a linguist should be reluctant to accept. But holding that brain states are observationally inaccessible and, at the same time, that linguistic constructions have an underlying psychological reality does not commit one to accepting such a dualism.

Let us suppose that the linguist constructs a theory by inferring hypothetically the characteristics of the mechanism underlying linguistic communication. His inference begins by positing a mechanism of which the observable events of linguistic communication are causal consequences. He invents a theory about the structure of this mechanism and the causal chain connecting the mechanism to observable events, to explain how these internal causes produce linguistic communication as their effect. Now it is clear that the linguist, though he claims that his theory describes a neurological mechanism, cannot immediately translate the theory into neurological terms, i.e. into talk about synapses, nerve fibers, and such. But—and this is the crucial point in showing that the mentalist is not a psychophysical dualist—this failure to have a ready neurological translation means only that he cannot yet specify what kind of physical realization of his theoretical description is inside the speaker's head. Since linguistics and neurophysiology are independent fields, it does not matter for the linguist what kind of physical realization is there. For the purpose of linguistic investigation, it is immaterial whether the mechanism inside the speaker's head is in reality a network of electronic relays, a mechanical system of cardboard flip-flops and rubber bands, or, for that matter, a group of homunculi industriously at work in a tiny office. All of these possibilities, and others, are on a par for the linguist as physical realizations of this mechanism, so long as each is isomorphic to the representation of linguistic structure given by the theory of the language. The critical distinction is, then, between an abstract, formal characterization of linguistic structure—the theory itself—and a physical system of some kind which instances this structure.[6] Discovering what kind of a physical system in the human brain instantiates the representation of structure given by a linguistic theory is the task of the neurophysiologist. The linguist's task is to provide a theory which represents the structure that any physical system must possess if it is to be capable of linguistic communication as we know it.

The theoretical constructions used by a mentalist linguist in building his theories are intended by him to have psychological reality. They do not, for the linguist, require translation into neurophysiological terms, even though reference to mental states is construed as reference to brain states. This is why the events

[6] Cf. H. Putnam, 'Minds and machines', *Dimensions of mind*, ed. by S. Hook (New York, 1960).

to which the mentalist's constructions refer can stand as links in the causal chain that contains vocalizations and sound waves as other links.

Why, now, do mentalistic linguistic theories excel taxonomic linguistic theories in descriptive and explanatory power, and why must mentalistic concepts be given credit for this excellence?

The three fundamental questions with which a synchronic description of a particular language deals are these:

(1) What is known by a speaker who is fluent in a natural language? That is, what facts about his language underlie his ability to communicate with others in that language?

(2) How is such linguistic knowledge put into operation to achieve communication? That is, how does a speaker use such linguistic knowledge to convey his thoughts, opinions, wishes, demands, questions, emotions, and so on to other speakers?

(3) How do speakers come to acquire this ability? That is, what innate dispositions and developmental processes are responsible for transforming a nonverbal infant into a fluent speaker?

An answer to (1) may be referred to as a 'linguistic description'.[7] A linguistic description has three components: syntactic, phonological, and semantic. If the linguistic description is a mentalistic theory, the syntactic component is a generative system which enumerates strings of minimally syntactically functioning units (which may be called formatives), together with a description of their syntactic structure. These structural descriptions, the output of the syntactic component in a linguistic description, are the input to both the phonological component and the semantic component. These two components are interpretative systems: the former interprets the abstract, formal descriptions of the syntactic structure of sentences as representations of vocal sound by assigning them a phonetic shape; the latter interprets them as meaningful messages. That is, the semantic component converts the outputs of the syntactic component into the messages that the sentences communicate to those who understand the language. The phonological and semantic components have no systematic connection with each other: one is concerned with pronunciation and the other with conceptualization.

An answer to (2) consists of at least two procedures. One is a 'sentence recognition procedure', whose function is to assign to any given perceived utterance a phonetic representation, a syntactic description, and a semantic interpretation. The function of the other procedure is to choose an appropriate syntactic structure for any message that the speaker wishes to communicate and to provide a phonetic representation for that structure; it is a 'sentence production procedure'. Together, the two procedures determine how the knowledge of the language embodied in the linguistic description is used by a speaker to understand and produce sentences.

An answer to (3) is a theory of language acquisition. Such a theory explains

[7] For further discussion of this concept cf. J. J. Katz and P. Postal, *An integrated theory of linguistic descriptions* (Cambridge, Mass., 1964).

how a nonverbal infant who is exposed in the normal way to a sample of sentences and nonsentences, and perhaps other data as well, comes to possess a linguistic description and procedures of sentence recognition and sentence production.

The first of the three questions is logically prior to the others. We must know what linguistic facts a speaker knows before we can say how those facts enable him to communicate and before we can say how he acquired them: linguistic description must precede inquiry into the nature of language use and acquisition. But this logical priority does not mean that the attempt to answer (2) and (3) must wait for a full answer to (1); rather, it means that substantive contributions toward an answer to (1) must be available in order that attempts to answer (2) and (3) can begin. Furthermore, it means—and this is critical—that the kind of answer that will be given, or sought, for (2) and (3) is determined by the kind of answer which is given or sought for (1). Since (2) is, in the same sense, logically prior to (3), the same applies to these two.

The basic fact about languages that a full answer to (1) must account for is that speakers can understand indefinitely many sentences never before encountered by them. So ubiquitous and commonplace is this fact that its theoretical significance is often missed: the very fact that almost every sentence we encounter is heard for the first time keeps us from fully appreciating how amazing it is that a fluent speaker is able to understand new sentences. But if we think about learning a foreign language, the theoretical significance of this feat becomes apparent immediately. We do not credit a person with mastery of a foreign language if he is only able to understand those sentences which he has been previously taught. The test of fluency is whether he can understand sentences that he has not been taught. The theoretical significance of understanding new sentences is that this ability is the test of whether one has mastery of a natural language.

To account for this feat in answering (1), the grammar must take the form of a system of rules which describe the structure of every sentence that a speaker would (in the absence of linguistically irrelevant psychological limitations) understand if he were to encounter it. Such rules must describe an infinite set of sentences because in a natual language there is no longest sentence. Given a sentence composed of n formatives, there is always another composed of $n + r$ formatives, formed from the first by various syntactic procedures, for instance by replacing a noun by a noun and a modifier which contains another noun, itself replaceable by a noun and a modifier, and so on. There will, of course, be a point at which still longer sentences cannot be either produced or understood by normal speakers in normal situations; but this limitation has to do with perceptual limits, the finite bound on memory storage, human mortality, and other linguistically inessential considerations. If we mistakenly identify these speech limitations with a finite-length limitation on what qualifies as a grammatical sentence of the language, we are forced to the absurd conclusion that, as such limitations are weakened (say, by the use of paper and pencil), either a new language is being used or the old one has undergone radical change.

This shows that a taxonomic grammar which describes only the sentences in a corpus fails to be empirically adequate: infinitely many grammatical sentences are left undescribed. Some taxonomic grammars are intended to describe the full set of sentences—that is, to segment and classify not only the sentences in a corpus but also of those that might be elicited and those that are of the same syntactic form as the elicited and elicitable sentences. But this should not obscure the theoretically more significant fact that such grammars are nonetheless put forth as data-cataloguing systems, the data being strings of syntactically well-formed formatives. Accordingly, their rules have no psychological reality, and cannot be construed as accounting for the knowledge that a speaker has which enables him to understand new sentences of his language. Furthermore, such rules cannot be the basis for an answer to (2), since an answer to (2) must relate the speaker's knowledge of the structure of sentences to procedures for applying this knowledge. For the same reason, such rules cannot be the basis for an answer to (3), since an answer to (3) is an input-output device which explains how a sample of sentences and nonsentences as input gives as output a linguistic description and procedures of sentence production and sentence recognition.

To show that a mentalistic theory of linguistic communication can succeed in answering (1), (2), and (3), and why mentalistic concepts are essential in giving it that power, we require an overall model which shows how the mechanism of linguistic communication operates in an actual situation. Such a model represents the most rudimentary form of the theory of linguistic communication which mentalists seek to construct, and is thus a first approximation toward an exact formulation of that theory in its fully sophisticated form. It should be stressed, however, that even as a first approximation such a model shares with the fully elaborated and precise theory the character and status of a hypothetically inferred theoretical construction.

Given that both speaker and hearer are equipped with a linguistic description and procedures for sentence production and recognition, we can reconstruct the communication situation in these terms. The speaker, for reasons that are biographically but not linguistically relevant, chooses some message he wants to convey to the hearer. He selects some thought he wishes to express to him, some command he wants to give him, or some question he needs to ask him. This message is, we may assume, in whatever form the semantic component of his linguistic description uses to represent the meaning content of thoughts, commands, questions, or the like. The speaker then uses the sentence production procedure to obtain an abstract syntactic structure having the proper conceptualization of his thought, command, or question as its semantic interpretation. This procedure helps him find a sentence that is suitable to the circumstances by rejecting all syntactic structures which, though they bear the proper semantic interpretation, are for sentences that are too long, syntactically too complicated, too pedantic, etc. After he has a suitable syntactic structure, the speaker utilizes the phonological component of his linguistic description to produce a phonetic shape for it. This phonetic shape is encoded into a signal that causes the speaker's articulatory system to vocalize an utterance of the sentence. The

sound waves of which these utterances consist are transmitted through the air and, after they reach the hearer's auditory system, are converted into a signal which is decoded into a phonetic shape. On the basis of that shape the hearer's sentence recognition procedure then provides a syntactic structure. That is, the procedure converts the signal produced by hearing the utterance into a phonetic shape whose physical realization is what reached the ear, and recovers the syntactic structure that the speaker originally chose as a formalization of his message. Once the hearer is in possession of this syntactic structure, he employs the semantic component of his linguistic description to obtain its semantic interpretation. He thus represents to himself the same message that the speaker wished to convey to him, and communication has taken place.

Although this model is phrased as if the processes described were conscious, no such assumption is involved. It is not an essential feature of mentalism that the processes postulated by the mentalist as going on inside a speaker's head should be open to the speaker's conscious awareness. This point alone ought to remove one source of opposition to mentalism in modern linguistics.

Within the framework of the above model of linguistic communication, every aspect of the mentalistic theory involves psychological reality. The linguistic description and the procedures of sentence production and recognition must correspond to independent mechanisms in the brain. Componential distinctions between the syntactic, phonological, and semantic components must rest on relevant differences between three neural submechanisms of the mechanism which stores the linguistic description. The rules of each component must have their psychological reality in the input-output operations of the computing machinery of this mechanism. The ordering of rules within a component must, contrary to the claims of Bloomfield and many others,[8] have its psychological reality in those features of this computing machinery which group such input-output operations and make the performance of operations in one group a precondition for those in another to be performed.

There are two further points concerning the superiority of a mentalistic theory. First, since the psychologist and the mentalistic linguist are constructing theories of the same kind, i.e. theories with the same kind of relation to the neurophysiology of the human brain, it follows that the linguist's theory is subject to the requirement that it harmonize with the psychologist's theories dealing with other human abilities and that it be consistent with the neurophysiologist's theories concerning the type of existing brain mechanisms. A linguistic theory that meets this requirement will have a wider range of facts into whose explanation it can enter and so will be a better theory than one which is otherwise equivalent to it in explanatory power. Such a theory enters into the explanation of many

[8] This, then, is the answer to Hockett's question about how to construe ordering otherwise than historically; cf. 'Two models of linguistic description', *Word* 10.233 (1954): '. . . if it is said that the English past tense form *baked* is "formed" from *bake* by a "process" of "suffixation", then no matter what disclaimer of historicity is made, it is impossible not to conclude that some kind of priority is being assigned to *bake* as against *baked* or the suffix. And if this priority is not historical, what is it?'

of those psychological theories with which it harmonizes. Theories of perception, theories of memory, of thinking, of learning, and other psychological theories leave open various questions about the effect of language on these processes and the effect of these processes on language; only a mentalistic theory of linguistic structure can hope to answer them. Further, by subjecting a linguistic theory to this requirement we make it more easily testable. For the requirement enables us to refute a linguistic theory if we can find psychological theories or facts that are inconsistent with it or neurophysiological accounts which describe brain structure in a way that precludes the linguistic theory from being isomorphic to any of the structures in the human brain. Again, a fruitful requirement like this can only be imposed on a mentalistic theory.

Second, a mentalistic theory also can provide a psychological reality for linguistic universals. Instead of linguistic universals being treated simply as common features of the linguistic description of every language, as they are in the the taxonomic view, the fact that such common features are universal, i.e. are necessary features of natural languages, is explained in terms of the psychology of human language learners, the one constant feature among all the individual differences between speakers of different natural languages, and all the differences between the situations in which they learn to speak. One clear-cut sense of psychological reality for linguistic universals is that proposed by Chomsky.[9] According to Chomsky's account, there are two kinds of linguistic universals, substantive and formal. The formal universals are specifications of the form of the rules that appear in each of the components of any empirically successful linguistic description of a natural language; the substantive universals are theoretical terms which enter into the formulation of the rules of particular linguistic descriptions. Chomsky's hypothesis is that the child is innately equipped with a language-learning device that contains such linguistic universals and a simplicity principle; the latter enables him to acquire the simplest linguistic description of the form determined by the linguistic universals which accords with the sample of utterances he is exposed to. Linguistic universals thus have psychological reality as part of the internal structure of the innate mechanism responsible for a child's acquisition of a language. Such a hypothesis, if true, explains why there should be a certain structure and content found in every language: they are found in every language because they are implanted by the innately given language-learning device that makes the acquisition of a natural language possible for normal humans.

Finally, why must this kind of psychological reality be attributed to the concepts of a mentalistic theory? Why can they not be regarded as mere fictions or as new kinds of data-cataloguing devices?

Bloomfield presents a particularly clear statement of the view against which I will argue. He writes,[10]

We can describe the peculiarity of these plurals [*knives, mouths*, and *houses*] by saying that the final [f, θ, s] of the underlying singular is replaced by [v, ð, z] before the bound form is

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[9] Chomsky, review of *Verbal behavior* by B. F. Skinner, *Lg.* 35.26–58 (1959).

[10] Bloomfield, *Language* 213.

added. The word 'before' in this statement means that the alternant of the bound form is the one appropriate to the substituted sound; thus, the plural of *knife* adds not [-s], but [-z]: 'first' the [-f] is replaced by [-v], and 'then' the appropriate alternant [-z] is added. The terms 'before', 'after', 'first', 'then', and so on, in such statements, tell the *descriptive order*. The actual sequence of constituents, and their structural order ... are a part of the language, but the descriptive order of grammatical features is a fiction and results simply from our method of describing the forms; it goes without saying, for instance, that the speaker who says *knives*, does not 'first' replace [f] by [v] and 'then' add [-z], but merely utters a form (*knives*) which in certain features differs from a certain other form (namely, *knife*).

Bloomfield says that the speaker 'merely utters a form (*knives*)'. I have argued that in order to answer the three fundamental questions of linguistics, this is not enough; it is necessary to explain why the speaker says this rather than *knifes*. The mentalist, I have argued, explains this fact of English pluralization by crediting the speaker of English with a linguistic description that contains both the kind of rules and the kind of ordering restriction that Bloomfield mentions. The mentalist asserts that an English speaker says *knives* rather than *knifes* because sentences whose underlying syntactic form is ... *knife + pl* ... are produced by using such rules and ordering restrictions to pass from this syntactic form to its phonological realization *knives*. Presumably Bloomfield's answer to this would be that one need not treat such rules and ordering restrictions as psychologically real; they may be regarded as fictions and still enable us to correctly predict the way in which speakers of English pluralize.

Here is the crux of the issue. It is true that these features of the grammar may be regarded as fictions and still enable us to predict the facts of English pluralization; but what is required for prediction and what is required for explanation are two different things. A few examples show this quite dramatically. Suppose I have a betting system for the races that never fails to pick the winner. The system may be based on numerology, astrology, geneaology, or what have you. Suppose, further, that my system predicts that a certain horse will win in the third race, and he does. If any basis for correctly predicting an event is also an acceptable explanation for the event once it has occurred, then we are forced to the absurd conclusion that the horse won because my system predicted it. Again, suppose I predict that Jones will be sick because he drank my home brew, and it is known that 95 per cent of those who drink it become sick: is it an explanation of Jones's illness that he drank my home brew? Obviously not, since to explain why Jones became sick we must explain how he differs from the 5 per cent who can drink home brew without becoming sick.[11] The crucial question, then, is why we cannot explain linguistic facts if we treat the rules and ordering restrictions of a linguistic description as simply convenient fictions.

As described above, the mentalist explains the facts about a speaker's and hearer's linguistic performance in terms of a model that reconstructs the process by which a message is transmitted from the speaker to the hearer through the speaker's encoding the message in the form of an utterance and the hearer's decoding that utterance back to the speaker's original message. Such a model explains why an utterance has a certain linguistic property, and what function

[11] Cf. S. Bromberger, *The concept of explanation* (dissertation, Harvard University, 1960), for the first set of convincing examples of this kind to be proposed.

that property has in the process of communication, by locating the property in the causal chain which links the utterance on one side to the neurophysiological mechanisms that perform the encoding and articulation, on the other side to those that accomplish the perception and decoding. But if, with the taxonomic viewpoint, we interpret any of the elements of the mentalist's description of the process of communication as merely fictions, rather than references to neurophysiological links in such a causal chain, the whole explanation collapses. For that interpretation would amount to the claim that there are gaps in the causal chain. If there are gaps, we cannot account for the causal antecedents of a linguistic property and of its effects. The Bloomfieldian mode of interpreting features of a linguistic description is like contending that the pressure of a gas on the walls of its container is the effect of molecules striking the walls, and at the same time denying that a molecule is a real physical object. The hypothesis of a mechanism of linguistic communication, with the kind of structure attributed to it by an optimal linguistic description, can explain how linguistic communication takes place only if the mechanism and all its features have the same ontological status as the utterance itself. The hypothesized mechanism must be capable of affecting the articulatory system of a speaker so as to produce an utterance, and capable of being affected by the output of his receptor system when stimulated by an utterance. This implies, however (to stress it again), no commitment for the mentalist to any particular kind of physical realization for the linguistic description, except that whatever is inside the speaker's head must be capable of causal connection with the physical sounds that serve as the vehicle of linguistic communication.[12]

The taxonomic linguist assumes that only his conception and treatment of linguistics saves the linguist from countenancing such occult mental entities as a 'spirit' and 'soul'. The truth is, rather, that mentalism also—in the only sense of 'mentalism' for which any serious claim to validity is made—avoids those occult entities. Both taxonomic and mentalist linguists deal exclusively with physically real events and structures. Both leave it to other sciences to determine the exact nature of the physical reality of the phenomena they theorize about. Just as the taxonomic linguist must leave it to the physicist to tell him about the physical reality of sound waves, and (if he is behavioristically inclined) to the physiologist to tell him about the physical reality of muscular contractions and glandular secretions, so the mentalist linguist must leave it to the neurophysiologist to tell him about the neurophysiological realization of his abstract linguistic description.

The actual difference between the taxonomic and the mentalistic conceptions of linguistics lies in what linguistic theories built on each of these conceptions can accomplish by way of answering questions (1), (2), and (3). We have found that the taxonomic linguist confines linguistic investigation to stating those facts about the structure of a natural language which can be formulated within the framework of a classificational system, while the mentalist goes far beyond

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[12] For a general discussion of the fictionalist view of scientific theories cf. Katz, 'On the existence of theoretical entities', in preparation.

this in seeking a full answer to all three questions. This difference is important: it justifies us in rejecting the taxonomic conception in favor of the mentalistic one. Taxonomic linguistics can only describe the utterances of a language; mentalistic linguistics not only can do this but can also explain how speakers communicate by using the utterances, and how the ability to communicate is acquired. Instead of the taxonomic linguist having a just complaint against the mentalist for appealing to occult entities, the mentalist has a just complaint against the taxonomic linguist for excluding from linguistics, a priori and arbitrarily, just what it is most important for this science to do. The freedom from mentalism inherent in the taxonomic conception of linguistics is its inherent weakness.