Reprinted from
ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Volume 263, Pages 197–200
September 19, 1975

THE RELATION OF COMPETENCE TO PERFORMANCE

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This paper is concerned with the relation of linguistic competence to linguistic performance, and with the epistemological status of what the systems of competence and performance represent. I hold that what both competence and performance represent is knowledge; competence represents knowledge of the structure of language and performance represents knowledge of the conditions of use of tokens of linguistic structures. This view of competence is standard;[1,2] this view of performance, perhaps, is not. The utility, and hence desirability, of this view of performance, however, will become apparent below.

I take the relation of competence to performance to be that competence is a component of idealized performance. Certainly, this view has much to recommend it. Consider such behaviors (aspects of performance in operation) as conscious punning and paraphrasing one's remarks. There is no way to describe punning behavior without assuming that the punner has available the literal meaning of what he says, which is one aspect of his knowledge of linguistic structure, and similarly for the behavior of paraphrasing. If we examine even the most fundamental aspects of linguistic performance—speech perception and speech production—we find, again, that the most plausible descriptions of the systems involved require the availability of purely linguistic knowledge. The problems to which a theory of speech comprehension must address itself are the speed and accuracy with which listeners determine the meaning of what is said in their presence, and whatever divergence there is between this utterance meaning and the literal meaning that the utterance type has by virtue of its linguistic structure. We will discuss the first problem later; let us now look more closely at the second of these two problems. First of all, the divergence in question is not simply an artifact of the claim that utterances are tokens of utterance types that have literal meanings as a consequence of their linguistic structures. Everyone who understands a language is aware of this divergence, and is in fact capable of exploiting it for various communicative purposes. Let me now introduce a couple of technical terms that will help to clarify the nature of the problem, and its theoretical solution. A semantically well-formed linguistic construction is said to be *meaningful*, whereas a semantically appropriate token of a linguistic construction in a particular situational context is said to be *significant*. Thus, an example like "Energy is equal to the product of mass times the square of the speed of light" is meaningful, but a token of it used by a teacher to nursery-school children would not be significant. On the other hand, an example like "Golf plays John" is not meaningful, but a token of this semantically ill-formed sentence used by John's golfing partners to describe his poor performance might be fully significant.

We can now address ourselves directly to the problem of accounting for the divergence of significance from meaningfulness, as it is systematically related to the contexts in which utterance tokens of sentence types are used. Consider an example such as "We certainly have a genius in the White House now." The literal meaning of this expression is that the inhabitant of the White House at this time is endowed with extraordinary intellectual ability, but we can easily imagine contexts in which the significance of this expression would be exactly the opposite. Our ability to compute

the relation of meaningfulness to significance as a function to context can be expressed informally as $F(S, C) = S'$, where S is a structural description of utterance type as provided by the theory of competence, C is a full specification of the relevant contextural information about the utterance token, and S' is a representation of the significance of this token in the specified context.[3] Note that we can now take S', the representation of the significance of the utterance token, to be the structural description of some expression different from the type represented by this token. Thus, in the contexts in which the expression "We certainly have a genius in the White House now" has a significance opposite to its literal meaning, we can take the significance to be represented by the literal meaning of the sentence-type "We certainly have a moron in the White House now." In other words, we can consider the theory of the internalized system that determines the significance of utterance tokens, like a grammar, to be a system of establishing sound-meaning correlations, only not ones for the language, but ones for particular utterance-context pairs. This very plausible model of one aspect of speech comprehension thus takes the availability of knowledge of linguistic structure as one of its crucial inputs.

The view that performance represents a system of knowledge, like competence, was first proposed to provide the basis for the claim that the systems of competence and performance interact: that properties of the system of knowledge of linguistic structures constrain the properties of the system of knowledge of the use of structures and vice versa.[4,5] Together with the view that performance theory incorporates competence, this view puts us in a position to give a more precise account of how it is that there are sentences in each natural language that no human being that knows that language can possibly use.

It is well known that grammars that have been written to describe the competence of native speakers of particular languages overgenerate in the sense that they characterize as part of these languages structures that none of those native speakers recognize as structures of those languages. For example, the regular grammatical processes in English that enable us to form relative-clause modifiers of nouns generate structures such as that found in the sentence "The man that the woman that the child that the dog that the cat that the mouse feared chased bit hugged saw screamed," which no speaker of English recognizes as such. This has sometimes led to skepticism regarding the adequacy of such grammars, and of the theories that permit them;[6] but if the inability of language users to deal with such sentences can be accounted for within the theory of performance, there is no reason to reject the theory of competence solely on the basis that it provides for the possibility of grammars that generate sentences that no native speaker recognizes.[7]

As we have already argued, a generalized theory of performance, one that is neutral with respect to acts of speaking, listening, or introspection, may be thought of as a function $F(S, C) = S'$, where S and S' are linguistic structures, and C is a representation of the relevant context in which a token of S is used, and F determines what a token of a given linguistic structure may be used to signify in a given context. If the external context is null, and if the structure S has no special significance to the individual who uses it, we represent the context as C_0; C_0 consists of just those performance principles that are systematically used in the direct comprehension of linguistic structures. If S is structured in such a way that the performance principles in C_0 permit it to be understood, it follows that $F(S, C_0) = S$, and we may say that the individual who has internalized the grammar that generates S, and the performance principles of C_0, knows that he knows that S is a structure of his language that relates a particular meaning to a particular sound sequence. This is so because that individual knows that S may be used to express a particular meaning solely by virtue of the fact that he knows that S has that meaning by the rules of his internalized grammar.

Now consider the case of a structure generated by the grammar that cannot be understood under any circumstances (excluding those involving direct instruction in the application of the rules of grammar to obtain that structure). Such a case may be represented by $F(S, C_o) = \emptyset$. This means that the sound-meaning correlation that the individual knows by virtue of his internalized competence to be associated with S is not available to that individual, even when he is introspecting about S. We conclude that while he knows that S is a structure of the language by virtue of his competence, he does not know that he knows it, by virtue of his performance.

The converse case, in which the performance system assigns an interpretation to a structure not generated by the grammar in the context C_o, is apparently much rarer, but does arise.[8] In such a case, we would say that the individual who uses that structure knows that it is not part of his language (again by virtue of his internalized grammar), but that he does not know that he knows that it is not.

As Miller and Chomsky have argued,[7] there is no reason to believe that the devices for constructing sentences that exceed the performance capacities of individuals who have internalized those devices, should disappear as languages evolve. There is reason to expect, however, that grammars should contain or develop devices for paraphrasing unintelligible structures in intelligible form. In many cases, syntactic transformations are such devices, as has been repeatedly noted.[1,7,9] In particular, transformations such as extraposition in English[10] have the effect of converting center-embedded structures (which tend to be unacceptable) into right-branching ones (which tend to be acceptable). However, even left- and right-branching structures ultimately cannot be comprehended,[11] and interestingly enough, grammars also provide devices for eliminating left- and right-branching structures in favor of coordinate-like structures, which turn out to be the most easily comprehended.[1,11] That grammars are organized in part to facilitate the operation of performance devices argues strongly for the view that competence and performance are describable as systems of knowledge that interact in the minds of individual speakers.

In conclusion, I should like to address myself directly to the major arguments that have been raised against the view that one's knowledge of a language is represented in the mind in the form of a generative, i.e. formal, grammar, and that this grammar is a component in the mental representation of performance (the mental structures that underlie performance). In the oral presentation of this paper at the conference on which this annal is based, I myself raised the objection that since formal grammars of natural languages contain infinitely many rules, they cannot directly be represented in the mind. But, being formal objects, grammars containing infinitely many rules can be finitely represented by a system of meta-rules, or *rule schemata*, as they are customarily called.[1] We may assume that what is mentally represented are meta-grammars, containing rule schemata, effective procedures for enumerating the infinitely many rules that these schemata abbreviate, and also effective procedures for computing the derivations of the sentences of the language given the rules of grammar.[12] Thus, the fact the grammars of natural languages are infinite objects does not provide the basis for objecting that competence cannot be mentally represented, and still be a formal representation of knowledge of language.

Second, it has been argued that if derivations of sentences are actually computed in the course of speaking and listening to speech, there should be some measurable consequence of that mental activity. It has been claimed that no such consequences have been found, and hence that the activity is not engaged in. The fallacy in this line of reasoning should be immediately apparent, but let me spell it out, just in case it isn't. Suppose we have two distinct grammatical sentences of a language, S_1 and S_2, whose derivations are identical, except that S_2 has undergone an optional syntactic transformation that S_1 has not. Suppose we find that under any behavioral measure of complexity we can think of, S_2 is never more complex than S_1 (t may even be the

case that on some of these measures, S_1 is more complex than S_2). It does not follow that therefore users of S_1 and S_2 do not compute the derivations of those sentences on the occasions of their use, since the computations may be performed so quickly that we have no measurement device subtle enough to record the difference between them, or that even if we do, the effects of computation are swamped by other factors, such as that the surface structures may differ in perceptual salience (recall that one of the effects of transformations is to simplify surface-structure representations).

Third, it has been argued that if our knowledge of linguistic structure is represented in the form of a generative grammar, it should take longer than it does for people to produce and to recognize sentences of their language. In fact, such arguments are directed only against the specific claim that we produce and recognize sentences using a grammar by the technique of "analysis-by-synthesis."[13] But this is not the only technique for performing speech production and recognition using a grammar. Suppose, instead, we view the speech production and recognition devices in the head as general-purpose finite-state devices. The states and instructions of those devices can be directly constructed from the rules (or meta-rules) of grammar; in fact, algorithms for such constructions (assuming the theory of context-free phrase-structure grammar, which is known to be inadequate, but which can be taken as a first approximation to a true theory of grammar), have been developed.[11,14] Hence the observation that we speak and comprehend sentences with great speed and accuracy in itself does not rule out the possibility that we use our internalized grammars in the course of speaking and listening to speech.

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