Before entering into the question of language and problems of knowledge, it may be useful to clarify some terminological and conceptual issues concerning the concepts "language" and "knowledge" which, I think, have tended to obscure understanding and to engender pointless controversy.

To begin with, what do we mean by "language"? There is an intuitive common-sense concept that serves well enough for ordinary life, but it is a familiar observation that every serious approach to the study of language departs from this quite sharply. It is doubtful that the common-sense concept is ever coherent, nor would it matter for ordinary purposes if it were not. It is, in the first place, an obscure sociopolitical concept, having to do with colors on maps and the like, and a concept with equally obscure normative and teleological elements, a fact that becomes clear when we ask what language a child of five, or a foreigner learning English, is speaking—surely not my language, nor any other language, in ordinary usage. Rather we say that the child and foreigner are "on their way" to learning English, and the child will "get there," though the foreigner probably will not, except partially. But if all adults were to die from some sudden disease, and children of five or under were to survive, whatever it is that they were speaking would become a typical human language, though one that we say does not now exist. Ordinary usage breaks down at this point, not surprisingly: its concepts are not designed for inquiry into the nature of language.

Or consider the question of what are called "errors." Many, perhaps most speakers of what we call "English" believe that the word "livid," which they have learned from the phrase "livid with rage," means "red" or "flushed." The dictionary tells us that it means "pale." In ordinary usage, we say that the speakers are wrong about the meaning of this word of their language, and so they would say this even if 99% or perhaps 100% of them made this "error." On the other hand, if dictionaries and other normative documents were destroyed with all memory of them, "livid" would then mean "flushed" in the new language. Whatever all this might mean, it plainly has nothing to do with an eventual science of language, but involves other notions having to do with authority, class structure, and the like. Unless the concept of "community norms" or "convention" is clarified in some manner yet to be addressed—if this is possible at all in a coherent way—one should be cautious about accepting arguments concerning meaning that make free use of such ideas, taking them to be clear enough, they are not. We understand this easily enough in connection with pronunciation; thus to say that the pronunciation of one dialect is "right" while that of another is "wrong" makes as much sense as saying that it world includes elements with valence of two which therefore behave in a certain way, or benzene rings, etc., is to say that whatever the elementary constituents of the world may be, their properties are such that they are correctly described in these terms at this level of abstraction. To say that the world includes such abstract entities as neural nets (it is the abstract structure that we take to be roughly invariant through time or among individuals, not the molecules, specific orientations, etc.) or mental representations is to say something similar about the brain. Mentalistic inquiry, so understood, is justified insofar as it yields insight and theoretical understanding of phenomena that concern us, and from another point of view, insofar as it facilitates inquiry into brain mechanisms. Just as nineteenth-century chemistry provided a guide to subsequent investigations of more "fundamental" physical entities, so one can expect the same to be true of the brain sciences, which have little idea what to seek without some sense of the nature of the latter to be discovered. Mentalism, in short, is just normal scientific practice, and an essential step toward integrating the study of the phenomena that concern us into the more "fundamental" natural sciences. I might add that it is generally pointless to demand too much clarity in these matters. As the history of physics and even mathematics shows, clarity about foundational issues (e.g., in mathematics, the notions of limit or even proof) develops as a result of inquiry and is not a necessary preliminary to it; foundational questions and questions of conceptual clarity are often premature, and can often be approached and settled only as research progresses without too much concern about exactly what one is talking about.

A typical formulation of a notion of English is the definition of "language" by the distinguished American logician, Leonard Bloomfield as "the totality of utterances that can be made in a speech community." the latter an abstract entity, assumed to be homogeneous. Another approach, based ultimately on Aristotelian conception of language as a relation of sound and meaning, is to define "language" as a set of pairs (a, m), where a is a sentence or utterance, and m is meaning, perhaps represented...
as some kind of set-theoretical object in a system of possible worlds, a proposal developed by David Lewis among others. There are other similar proposals.

Under any of these proposals, a grammar will be a formal system of some kind that enumerates or "generates" the set chosen to be "the language," clearly an infinite set for which we seek a finite representation.

The concept "E-language" and its variants raise numerous questions. In the first place, the set is ill defined, not simply in the sense that it may be vague, with indeterminate boundaries, but in a deeper sense. Consider what are sometimes called "semi-grammatical sentences," such as "the child seems sleeping." Is this in the language or outside it? Either answer is unacceptable. The sentence clearly has a definite meaning. An English speaker interprets it in a definite way, quite differently from the interpretation that would be given by a speaker of Japanese. Hence it cannot simply be excluded from the set "E-language," though it is plainly not well formed. But speakers of English and Japanese will also differ in how they interpret some sentence of Hindi—or for that matter how they will interpret a wide variety of noises—so the difference in languages and the vast range of other sounds also fall within English, a conclusion that makes no sense. It is doubtful that there is any coherent solution to this range of problems. The fact is that a speaker of English, Japanese, or whatever, has developed a system of knowledge, but assigns a certain status to a vast range of physical events, and no concept of E-language, nor any concept developed from it, is likely to be able to do justice to this essential fact.

A second problem has to do with choice of grammar. Evidently, for every set there are many grammars that will enumerate it. Hence it has commonly been argued, most notably by W. V. Quine, that choice of grammar is a matter of convention, not truth, like the choice of a "grammar" for the well-formed sentences of arithmetic in some notation. But now we face a real question about the subject matter of the study of language. Clearly, there is some fact about the mind/brain that differentiates speakers of English from speakers of Japanese, and there is a truth about this matter, which is ultimately a question of biology. But sets are not in the mind/brain, and grammars can be chosen freely as long as they enumerate the E-language, so the study of E-language, however constructed, does not seem to bear on the truth about speakers of English and Japanese; it is not, even in principle, part of the natural sciences, and one might argue that it is a pointless pursuit, a kind of chasing after shadows. Many philosophers—W. V. Quine, David Lewis, and others—have concluded that linguists must be in error when they hold that they are concerned with truths about the mind/brain, though clearly there are such truths about language for someone to be concerned with; they also hold that puzzling philosophical problems are raised by the claim that grammars are "internally represented" in some manner. Others (Jerold Katz, Scott Soames, and others) have held that linguistics is concerned with some Platonic object that we may call "P-English." P-E is what is independent of what may be true about the psychological states or brains of speakers of English. One can see how these conclusions might be reached by someone who begins by construing language to be a variety of E-language.

There is little point arguing about how to define the term "linguistics," but it is plain that there is an area of investigation, let us call it "C-linguistics" (cognitive linguistics) which is concerned with the truth about the mind/brains of the people who speak C-English and C-Japanese, suitably idealized. This subject belongs strictly within the natural sciences in principle, and its links to the main body of the natural sciences will become more explicit as the neural mechanisms responsible for the structures and principles discovered in the study of mind come to be understood. As I noted earlier, the status of this study of language and mind is similar to that of nineteenth-century chemistry or pre-DNA genetics; one might argue that it is similar to the natural sciences at every stage of their development. In any event, C-linguistics raises no philosophical problems that do not arise for scientific inquiry quite generally. It raises numerous problems of fact and interpretation, but of a kind familiar in empirical inquiry.

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The status of P-linguistics, or of the study of E-language generally, is quite different. Thus the advocates of P-linguistics have to demonstrate that in addition to the real entities C-English, C-Japanese, etc., and the real mind/brain of their speakers, there are other Platonic objects that they choose to delineate and study. Whatever the merits of this claim, we may simply put the matter aside, noting that people may study whatever abstract object they construct. This still leaves the apparent problem noted by Quine, Lewis, and others who argue that it is "folly" to claim that one of a set of "extensionally equivalent systems of grammar" that enumerate the same E-language is correctly attributed to the speaker-hearer as a property physically encoded in some manner, whereas another one merely happens to enumerate the E-language but is not a correct account of the speaker's mind/brain and system of knowledge. Plainly this conclusion cannot be correct, given that it is true that there is some truth about the mind/brain and the system of knowledge represented in it, so some error must have crept in along the way.

Note that the question is not one of metaphysical realism, or of choice of theory in science. Take whatever view one wants on these matters, and it is possible to remember that further philosophical problem, or "folly," arises in the case of attribution of one grammar but not another extensionally equivalent one to a speaker-hearer, a conclusion that is transparently in error, but seems to be as well founded as the correct conclusion that there is no "true" grammar of arithmetic. We seem to be left with a puzzle.

A third class of problems that arise from the study of E-language has to do with the properties of these sets. Sets have formal properties, so it seems to be meaningful to ask whether human E-languages have certain formal properties: are they context-free, or recursive, or denominalizable? All of these choices have been made, and denied, but the point is that the questions are taken seriously, though it is far from clear that the questions are even meaningful. The answers are also thought to have some crucial bearing on questions of parsing and learnability, but quite wrongly, for reasons discussed years ago.
to the theory of the language, and to understand the language as we may call it “language,” where “” is to suggest “intensional” and “inerrational.” The I-language is what the grammar purports to describe: a system represented in the mind/brain, ultimately in physical mechanisms that are now largely unknown, and is in this sense internalized; a system that is “intensional” in that it may be regarded as a specific function considered in intention—that is, a specific characterization of a function—which assigns a status to a vast range of physical events, including the utterance “John seems to be sleeping,” the utterance “John seems sleeping,” a sentence of Hindi, and probably the squeaking of a door, if we could do careful enough experiments to show how speakers of English and Japanese might differ in the way they “hear” this noise.

As contrasted with E-language, however construed, I-languages are real entities, as real as chemical compounds. They are in the mind, ultimately in the brain, in the same sense as chemical elements, organic molecules, neural nets, and other entities that we construct and discuss at some appropriate abstract level of discussion are in the brain. They are what they are, and it is a problem of science to discover the true account of what they are, the grammar for the speaker in question. The story presented by many linguists is entirely backwards. It is the E-language, not the I-language (the “grammar,” in one of the two senses in which this systematically ambiguous phrase has been used), that poses philosophical problems, which are probably not worth trying to solve, since the concept is of no interest and has no status. It may, indeed, be pure “fool” to construct and discuss it, to ask what formal properties E-languages have, and so on. I suspect it is. In particular, the analogy to formal systems of arithmetic and so on is largely worthless, and should be discarded, though other analogies to arithmetic and logic, as systems of mentally represented knowledge, are quite definitely worth pursuing, and raise quite interesting questions, yet to be seriously explored. The debates of the past generation about these matters seem to me a classic example of the philosophical errors that arise from misteploring concepts of ordinary language—in this case, developing a useless, perhaps quite senseless concept, and assuming erroneously that it is the relevant scientific notion that corresponds to, or should replace, some concept of ordinary language—a source of philosophical error that was clearly exposed in the eighteenth-century critique of the theory of ideas, if not earlier, and has more recently been brought to general attention by Wittgenstein.

Let us now use the term “language” to refer to I-language, and the term “grammar” to refer to the theory of an I-language. What about the term “universal grammar,” recently resurrected and given a sense that is similar to the traditional one, but not identical, since the entire framework of thinking has been radically modified? The term “universal grammar” has also been used with systematic ambiguity, to refer to the linguist’s theory and to its subject matter. In keeping with our effort to select terms so as to avoid pointless confusion, let us use the term “universal grammar” to refer to the linguist’s theory only. The topic of universal grammar is, then, the system that specifies what it is to be a human language. This system of principles is a component of the mind/brain prior to the acquisition of a particular language. It is plausible to suppose that this system constitutes the initial state of the language faculty, considered to be a subsystem of the mind/brain.

Let us now consider the question of knowledge. The language a person has acquired underlies a vast range of knowledge, both “knowledge-how” and “knowledge-that.” A person who speaks English, for example, a person who speaks the language English (meaning, a particular I-language that falls within what is informally called “English”) knows how to speak and understand a variety of sentences, knows that certain sounds have certain meanings, and so on. These are typical cases of knowing-how and knowing-what, ordinary propositional knowledge in the latter case, and this of course does not exhaust the range of such knowledge. It seems entirely reasonable to think of the language as a system that is internalized in the mind/brain, yielding specific cases of propositional knowledge or knowledge how to do so and so. We now have to consider at least three aspects of knowledge: (1) the internalized system of knowledge of the language, (2) knowing how to speak and understand, and (3) knowledge that sentences mean what they do (etc.). It is common among philosophers, particularly those influenced by Wittgenstein, to hold that “knowledge of language is an ability,” which can be exercised by speaking, understanding, reading, talking to oneself: “to know a language just is to have the ability to do these and similar things,” and indeed more generally knowledge is a kind of ability. Some go further and hold that an ability is expressible in dispositional terms, so that language becomes, as Queiroz described it, “a complex of present dispositions to verbal behavior.” If we accept this further view, then two people who are disposed to say different things under given circumstances speak different languages, even if they are identical twins with exactly the same history, who speak the same language by any sensible criteria we might establish. There are so many well-known problems with this conception that I will simply drop it. And consider the vaguer proposal that knowledge of language is a practical ability to speak and understand (Michael Dummett, Anthony Kenny, and others, in one or another form).

The radical differences from ordinary usage is, in my view, entirely unwarranted. To see how radical is the departure from ordinary usage, consider the consequences of accepting it, now using “ability” in the sense of ordinary usage. In the first place, ability can improve with no change in knowledge. Thus suppose Jones takes a course in public oratory, improves his ability to speak and understand, but learning nothing new about his language. The language that Jones speaks and understands is exactly what it was before, and his knowledge of language has not changed, but his abilities have improved. Hence knowledge of language is not to be equated with the ability to speak, understand, etc.

Similarly, ability to use language can be impaired, and can and disappear, with no loss of knowledge of language at all. Suppose that Smith, a speaker of English, suffers Parkinson’s disease, losing entirely the ability to speak, understand, etc. Smith then does not lose “the ability to do these and similar things,” and therefore does not have knowledge of English, as the term is defined by Kenny, Dummett, and others. Suppose that use of the chemical I-Dopa can restore Smith’s ability completely, as has been claimed (it does not matter whether the
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other one. The argument is the same as before. Knowing-how is not simply a matter of ability, nor, surely, is knowing-that, connymy to much widely accepted doctrine. In fact, it is quite clear from closer investigation of the concept "knowing-how." Rather, knowing-how involves a crucial cognitive element, some internal representation of a system of knowledge. Since this matter is not germane here, I will not pursue it.

Could we say, then, that knowing how to speak and understand a language is in no formal way different from knowing how to ride a bicycle, as is commonly alleged, so that we need not be driven to assume a mentally-represented system of knowledge in the case of language? There are at least two fundamental problems with this line of argument. First, knowing-how in general involves a cognitive element, as just noted. Secondly, the "just like" argument is quite empty. We might as well say that there is no real problem in accounting for the ability that some people have to write brilliant poetry or prose in another language or to discover deep theories or scientific principles: it is just like knowing how to ride a bicycle. What possible point can there be to such proposals?

In any particular case, we have to discover what kind of cognitive structures underly knowing how to do so-and-so or knowing that such-and-such is true. We must be wary of the facile generalization that all examples of this sort can be reduced to the "just like" argument. The principles were also employed in physics for a time, but I suspect that they had little impact there, since the physicists who professed the principles generally continued to do their work in utter contradiction to them, quite wisely. (We omit examples that are discussed in standard literature, see, e.g., the reference in note 2.)

The central problem of the theory of language is to explain how language can be understood in this sense, and this is where the standard theory of language breaks down. It is too simplistic to say that language is just a collection of signs or sounds, and that we understand language by understanding the signs or sounds. The problem is more complex, and the answer more subtle. The answer is that we understand language by understanding the meanings of the signs or sounds. This is the essence of the theory of language, and it is the essence of the theory of knowing how to use language, and thus, of the theory of knowing how to speak and understand a language.
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The grammar—as a system of habits, dispositions or abilities, Otto Jespersen being a rare and notable exception. When the question was addressed, the conventional answer was that new forms are produced and understood "by analogy" with familiar ones. (But this explanation in empty until an account is given of analogy, and access exists.)

In the past few years it has been shown that a wide range of phenomena from typologically quite different languages can be explained on the assumption that the language faculty of the mind-brain cannot be a digital computation following very general principles, making use of representations of a precisely determined sort, including empty categories of several kinds. This work then provides evidence, quite strong evidence I believe, for some rather striking and surprising conclusions: that the language faculty, part of the mind-brain, is in a crucial part a system of digital computation of a highly restricted character, with simple principles that interact to yield very intricate and complex results. This is a rather unexpected property of a biological system. One must be alert to the possibility that the conclusion is an artifact, resulting from our mode of analysis, but the evidence suggests quite strongly that the conclusion effects reality.

As far as I am aware, there is only one other known biological phenomenon that shares the properties of discrete infinity exhibited by language, and it bears similar principles of digital computation: namely, the human number faculty, also a property essentially common to the species and unique to it, and, like human language, unteachable to other organisms, which lack the requisite faculties. There are, for example, numerous animal communication systems, but these are by far as complex as the language of bees, continuous in whatever sense can say this of a physical system: the human natural system; etc.). Note that the difference between human languages and these communication systems is not one of "more" or "less," at one of difference in quality: indeed, it is useful to note any sense can be given to the idea that a single language is a communication system, though it can be used for communication along with much else. These observations suggest that at some remote period of evolutionary history, the brain developed a certain capacity for digital computation, for employing recursive rules and associated mental representations, thus acquiring the basis for thought and language in the human sense, with the arithmetic capacity per se being as a kind of abstraction from the language faculty, to be evoked when cultural conditions allowed, much later, in fact, in the case of some societies, so it appears. Notice that there is surely no reason to suppose that every trait is specifically selected.

The phenomena of the languages of the world appear to be highly diverse, but, increasingly, it has been shown that over a large and impressive range they can be accounted for by the same principles, which yield highly varied results as the properties of each language vary from language to language. Thus in Spanish, there are clitic pronouns, including the directive, while in English there are not, so that the forms of English and Spanish, say in causative constructions, look quite different. But the principles that govern them appear to be essentially the same, their consequences differing by virtue of the lexical property of the pronoun system: in Spanish, but not in English, there is a system of pronouns that are lexically marked as affixes, and therefore must attach to other elements. The manner in which these affixes attach, and the targets to which they attach, are determined by the same principles that determine the formation of complex syntactic constructions such as operator-variable constructions and others, so it now appears.

In other languages, many more items are identified in the lexicon as affixes, and the same syntactic principles determine complex morphological forms that reflect in another way the same underlying and near universal underlying structures. Thus in Japanese, the causative element is not a verb, like Spanish hacer or English make, but rather an affix, so a verb must move from the embedded clause to attach to it, yielding what appears to be a monoclinal causative as distinct from the English-Spanish biclinal causative: in Spanish, too, there is a reflection of the same process when it raises to the main

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verb in the sentence "Juan se hizo eficaz," as if "hizo-eficaz" were a single word. The point is that as lexical items vary, the very same principles determine a wide range of superficially different complex phenomena in typologically quite different languages.

The principles of universal grammar are fixed as constituent elements of the language faculty, but languages clearly differ. How do they differ? One way has already been noted: they differ in properties of lexical items, though here the options are narrowly constrained by general principles. Beyond that, it seems that the principles allow for a limited range of variation. That variation is limited has often been explicitly denied. The leading American linguist Edward Sapir held that languages can vary "without assignable limit," and Martin Joos put forth what he called the "Boasian" view, referring to Franz Boas, one of the founders of modern linguistics: namely, that languages could differ from each other without limit and in unimagined ways. Such views echo William Dwight Whitney, who greatly influenced Ferdinand de Saussure, and who emphasized "the infinite diversity of human speech."

Such views perhaps appeared tenable in some form if one regarded language as a habit system, a network of practical abilities, a complex cognitive skill. In that case, language would be constrained only by whatever general conditions constrain the development of abilities and habits in general, by what are sometimes called "generalized learning mechanisms," if these exist. But this conception does not allow one even to approach the essential features of normal language use, as has been demonstrated beyond reasonable doubt in my view, and so already noted, the conception has been entirely unproductive.

Assuming without further discussion that this conception must be abandoned, the question of language variation will take on a new form in the context of a general revision of the framework of inquiry into problems of natural language. A conceptual change of this nature was proposed about thirty years ago, driving in a new form some long-forgotten approaches to the study of natural language. This rather sharp conceptual change underlies the research program that has been given the name "generative grammar," referring to the fact that the grammar—or as we are now more properly calling it "the language"—generates an unbounded range of specific consequences, assigning a status to every expression and thus providing the mechanism for the creative aspect of language use. The central question of the study of language, conceived along the lines of the earlier discussion, now become the following:

(i) What is the system of knowledge attained by a person who speaks and understands a language?
(ii) How is that knowledge acquired?
(iii) How is that knowledge put to use?

The last question has two aspects, the production problem and the perception problem. The second question how language is acquired, is a variant of what we might call "Plato's problem," for many have already demonstrated that there is a lot of theory in fact know geometry, perhaps the first psychological (thought)-experiment. The problem is not a trivial one: people know a great deal more than can possibly be accounted for in terms of the standard paradigms of epistemology (or perhaps more accurately, what they know is different from what one might expect from the terms), language being a striking example. The production problem might be called "Descartes' problem," referring to one of the central Cartesian criteria for the existence of other minds: namely, when experiment demonstrates that another creature that resembles us exhibits the creative aspect of language use, then it would only be reasonable to attribute to the creature a mind like ours. In more recent years, a similar idea has been called "the Turing Test." This problem, one aspect of more general problems concerning will and choice, remains beyond the scope of serious human inquiry in fact, and may be so in principle, rather as Descartes suggested. In any case, having nothing to say about it, I shall put it aside, keeping just to the perception problem, or what is sometimes called "the parsing problem" (restricting attention to certain computational aspects).

These questions were posed as constituting the research program of generative grammar.
about thirty years ago, along with an argument to the effect that prevailing answers to them in terms of habit systems and the like were completely unacceptable for reasons already briefly discussed. What alternative, then, can we propose? I will keep to the terminology suggested above, departing from earlier usage.

The first proposal was that a language is a rule system, where the kinds of rules and their inter-relations are specified by universal grammar. In one familiar conception, the rules included context-free rules, lexical rules, transformational rules, phonological rules (in a broad sense), and what were misleadingly called "rules of semantic interpretation" relating syntactic structures to representations in a system sometimes called "LF," suggesting "logical form" but with certain qualifications. This term “rules of semantic interpretation” is misleading, as David Lewis among others has pointed out, because these rules relate syntactic objects, mental representations. They relate syntactic structures and LF-representations, which are syntactic objects. The term "semantics" should properly be restricted to the relation between language and the world, or to use of language, some might argue. The criticism is accurate, but it applies far more broadly. In fact, it applies in exactly the same form to what Lewis and others call "semantics," where "meanings" are set-theoretic objects of some sort: models, pictures, situations and events, or whatever. These are mental representations, not elements of the world, and the problem arises of how they are related to the world. It is often assumed that the relation is trivial, something like incorporation, so that it is unnecessary to provide a justification for these particular systems of mental representation, but it is easy to show that this cannot be true unless we trivialize our conception of what the world is by restricting attention to something like what Nelson Goodman calls "versions": all mental representations, abandoning (perhaps as meaningless) the question of why one collection of "versions" is jointly acceptable or "right" and others not, that is, not pursuing the commonsense answer: that certain versions are jointly "right" because of their accord with reality. But if we take this tack, which I do not suggest, semantics disappears and we are only studying various systems of mental representation. In fact, much of what is called "semantics" is really the study of the syntax of mental representation. It is a curious fact that those who correctly call their work in this area "syntax" are said to be avoiding semantics, while others who incorrectly describe their studies of syntax as "semantics" are said to be contributing to semantics.

Adopting this conception of language, a language is a complex of rules of the permitted format, interconnected in a way permitted by universal grammar. In contrast to the conception of language in terms of habit systems or abilities, this was an extremely productive idea, which led quickly to a vast increase in the range of phenomena brought under investigation, with many discoveries about facts of language, even quite simple ones, that had never been noted or explored. Furthermore, the array of phenomena discovered and investigated were made intelligible at some level, by providing partial rule systems that accounted for their properties. The depth of explanation, however, could never really be very great. Even if appropriate rule systems could be constructed, and even if these systems were found to be restricted in type, we would always want to know why we have these kinds of rules and not others. Thus, languages typically have rules that allow the direct object of a verb to function as its subject, though it is still being interpreted as the object, but the converse property does not exist. Or consider again causative constructions, say, the form that we can give in abstract representation as (2), where the element CAUSE may be a word as in Spanish-English or an affix as in Japanese:

(2) problems CAUSE [that Y lies]

The principles of universal grammar permit a realization of this abstract form as something like (3), where CAUSE is an affix, or with CAUSE-le associated in a closely linked verb sequence as in Spanish:

(3) problems CAUSE-le Y

But the form (4) does not underlie a possible realization as (5):

(4) [that Y lies] CAUSE problems

(5) Y CAUSE-le problems
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identifies words, and on the basis of their lexical properties, projects a syntactic structure as
determined by principles of universal grammar and the values of the parameters. Connection
and associations among these elements, includ-
ing the empty categories that are forced to
appear, are determined by other principles of
universal grammar, perhaps parameterized. Thus
given the sentence “a quisín se hizo Juan
Astrid,” the mind of the speaker of Spanish
automatically assigns a structure with two
empty categories, one the subject of “Astrid,”
another its object. Principles of universal gram-
mar then produce a contradiction, in the manner
informally described earlier, and the sentence
receives no coherent interpretation, though of
course it has a status; thus the Spanish speaker
assigns to it a lexical and syntactic structure,
and might even be able to “force” a certain
meaning, if the sentence were produced by a
foreigner, by me for example. A monolingual
speaker of English will also assign a certain sta-
tus to this expression, at least in some kind of
phonetic representation, very likely consider-
ably more.

The development of rule systems in favor of
a principles-and-parameters approach, which
has been gradually developing over the past
twenty-five years and has been achieved to a
substantial extent only in the past half-dozen
years, has been extremely productive. It has,
once again, led to a vast leap in empirical cov-
erage, in the development of empirical materials
discovered in well-studied languages, and with
languages of great typological variety incorpo-
rated within essentially the same framework.
The depth of explanation has also advanced
considerably, as it has become possible to
explain why there are processes described by
certain rules but not others. The principles
now
being
developed yield very sharp and surprising
predictions about languages of varied types,
predictions which sometimes prove accurate,
and sometimes fail in highly instructive ways.
My guess is that we are at the beginning of a
radically new and highly productive phase in
the study of language.

The shift of perspective from rule systems to
a principles-and-parameters approach might be
regarded as a second major conceptual change
in the development of generative grammar, the
first being the conceptual change noted earlier
as part of the so-called “cognitive revolution,”
from a conception of language as a system of
habits or abilities to a metalinguistic approach
that
regards
language
as
a
computational
system of the mind/brain—a step towards integrat-
ing the study of language to the natural sciences,
for the reasons discussed earlier. The second shift
of perspective is more theory-internal than the
first shift, a significant break from the tradition
of “formal” grammar and of “structural” grammar
as used in the modern, formal study of language,
and the basic notion of the discipline and the
ways in which problems are formulated and addressed
take on a considerably
different
form as well.

The principles-and-parameters approach
yields a rather new way of thinking about ques-
tions of typology and comparative
historical
linguistics. Consider again the analogy of spe-
ciation in biology. Apparently, small changes
in the way fixed mechanisms function can
produce large-scale phenomenal differences,
yielding different species of organisms. In gen-
eral, a slight change in the functioning of a
rigidly structured and intricate system can
yield very complex and surprising clusters of
differences as its effects filter through the
system. In the case of language, change of a single
parameter may yield a cluster of differences
which, on the surface, appear disconnected, as
its effects filter through the invariant system of
universal grammar. The reason to believe
that something of the sort is correct. Thus,
among the Romance languages, French has a
curious status. It differs from the other
Romance languages in a cluster of properties,
and it appears that these differences emerged fairly recently, and at about the same time. It may be that one parameter was changed—the null subject parameter—or perhaps subject to be suppressed, some have speculated—yielding a cluster of other modifications through the mechanical working of the principles of universal grammar, and giving French something of the look of a Germanic language. At the same time, French and Spanish share certain features distinguishing them from Italian, and there are numerous other complexities as we look at the actual languages, or "dialects" as they are called. Similarly, we find most remarkable similarities among languages that have to known historical connection, suggesting that they have simply set crucial parameters the same way. These are essentially new questions, which can now be seriously formulated for the first time and perhaps addressed.

As conceptions of language have changed over the years, so has the notion of what counts as a "real" system. Suppose we have some array of phenomena in some language. In the era of structural-descriptive linguistics, a large body of data was put in a useful arrangement of the data. As all languages are put in the major theoretical work of function, structural linguistics, a grammar provides a compact one-one representation of the phenomena in a corpus of data. Some, for example, say that Jakobson, went further in insisting on uniformity to certain general laws, particularly phonology, but in very limited ways. Under the conception of language as a rule system, this would no longer count as a significant result: such a description poses rather than solves the problem at hand. Rather, it could be necessary to produce a rule system of permitted format that predicts the data in question and in nontrivial cases, infinitely.

This is a much harder task, but not a pointless one; there are many possible rule systems, and, with effort, it is often possible to find such that satisfies the permitted format, if this is too restricted. Under the more recent principles-parameters approach, the task becomes harder. A rule system is simply a description: it is rather than solves the problem, and a "real" task consists of a demonstration of the phenomena under investigation, and countless others, can be explained by selecting properly the values of parameters in a fixed and invariant system of principles. This is a far harder problem, made still more difficult by the expansion of empirical materials in widely differing languages. A parameter theory has come to be partially understood, and to which any general theory must be responsible. Where the problem can be solved, we have results of some depth, well beyond anything imaginable earlier. It is an important fact that the problem is now intelligibly formulable, and that indications are being produced over an interesting range, while efforts to pursue this inquiry are uncovering a large mass of new unexplored phenomena in a wide variety of languages that pose new challenges, previously unknown.

This discussion has been based on the assumption that lexical items are somehow learned and available, suggesting that apart from parameter-setting, language acquisition as well as parsing and presumably the creative use of language (in the unlikely event that we can come to understand anything about this matter) are to a large extent determined by properties of the lexicon. But acquisition of lexical items poses Plato’s problem in a very sharp form. As anyone who has tried to construct a dictionary or to work in descriptive semantics is aware, it is a very difficult matter to describe the meaning of a word, and such meanings have great intricacy and involve the most remarkable assumptions, even in the case of very simple concepts, such as what counts as a possible "thing." At peak periods of language acquisition, children are "learning" many words a day, meaning that they are in effect learning words on a single exposure. This can only mean that the concepts are already available, with all or much of their intricacy and structure predetermined, and the child’s task is to assign labels to concepts, as might be done with very simple evidence.

Many have found this conclusion completely unacceptable, even absurd; it certainly departs radically from traditional views. Some, for example Hilary Putnam, have argued that it is entirely implausible to suppose that we have "an innate stock of notions" including carburator, bureacracy, etc. If we were correct about this, it would not be particularly to the point, since the problem arises in a most secure connection with simple words such as table, person, chase, bureaucrate, etc. But his argument for the examples he mentions is not compelling. It is that to have given us innate stock of notions, "evolution would have had to be able to anticipate all the contingencies of future physical and environmental configurations. Obviously it didn’t and couldn’t do this." A very similar argument has long been accepted in immunology; namely, the number of antigens is so immense, including even artificially synthesized substances that had ever existed in the world, that it was considered absurd to suppose that evolution had provided "an innate stock of antibodies"; rather, formation of antibodies must be a kind of "learning process" in which the antigens played an "instructive role." But this assumption has been challenged, and is now widely assumed to be false. Nils Kaj Jerne won the Nobel Prize for his work challenging this idea, and publishing his own concept, "B-cell somatic mutation" to make specific antibodies, unless it has already made antibodies of this specificity before the antigen arrives, so that antibody formation is a selective process in which the antigen plays a selective and amplifying role. Whether or not Jerne is correct, he certainly could be, and the argument is not based on the intuitive notion of words, meanings, the argument being quite analogous.

Furthermore, there is good reason to suppose that the argument is at least in substantial measure correct, even for such words as carburator and bureaucrate, which, in fact, pose the familiar problem of poverty of stimuli if we attend carefully to the enormous gap between what we know and the evidence on the basis of which we know it. The same is true of technical terms of science and mathematics, and it is quite surely the case for the terms of ordinary discourse. However surprising the conclusion may be that nature has provided us with an innate stock of concepts, and that the child’s task is to discover their labels, the empirical facts appear to leave open few other possibilities. Other possibilities (say, in terms of "generalized learning mechanisms") have not, to my knowledge, been coherently formulated, and if they were some day formulated, it may well be that the apparent issue will dissolve.

To the extent that anything is understood about lexical items and their nature, it seems that they are based on conceptual structures of a very specific and closely integrated type. It has been argued plausibly that concepts of a locational nature, including goal and source of action, object moved, place, etc., enter widely into lexical structure, often in quite abstract ways. In addition, notions like actor, recipient of action, event, intention, and others are pervasive elements of lexical structure, with their specific properties and permitted interrelations. Consider, say, the words chase or person, like their Spanish equivalents, they clearly involve a reference to human intention. To chase Jones is not only to follow him, but to follow him with the intent of staying on his path, perhaps to catch him. To persuade Smith to do something is to cause him to decide or intend to do it; if he never decides or intends to do it, we have not succeeded in persuading him; in other cases, "persuade" cannot be stimulated to make specific antibodies, unless it has already made antibodies of this specificity before the antigen arrives, so that antibody formation is a selective process in which the antigen plays a selective and amplifying role. Whether or not Jerne is correct, he certainly could be, and the argument is not based on the intuitive notion of words, meanings, the argument being quite analogous.

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among words, and more broadly, among expressions involving these words. Syntactic relations provide a rich array of further examples. It appears, then, that one of the central conclusions of modern philosophy is rather dubious: namely, the contention, often held to have been established by work of Quine and others, that one can make no principled distinction between questions of fact and questions of meaning, that is a matter of more or less deeply held belief. "Philosophers have, I think, been led to this dubious conclusion, which is held by some (e.g., Richard Rorty) to have underestimated the ontological hought, by concentrating on an artificially narrow class of examples, in particular, on concepts that have little or no relational structure: such entities as 'cats are animals.' Hence, indeed, it is not easy to find evidence to decide whether the sentence is true as a matter of meaning or act, and there has been much incoherence among the debates. When we turn to more complex categories with an inherent relational structure such as "persuade or choose," or to more complex syntactic constructions, it seems clear that analytic connections are readily discerned.

Furthermore, the status of a statement as a "truth of meaning or of empirical fact can and must be established by empirical inquiry, and considerations of many sorts may well be relevant; for example, inquiry into language acquisition and the variation among languages. The question of the existence of analytic truths and connections, therefore, is an empirical one, to be settled by empirical inquiry that goes well beyond the range of evidence ordinarily brought to bear. Suppose that two people differ in their intuitive judgments as to whether I can convince John to go to college without his acceding to intending to do so. We are by no means at an impasse. Rather, we can construct conflicting theories and proceed to test them. We who hold that the connection between persuade and decide or intend is conceptual will proceed to elaborate the structure of the concepts, their primitive elements, and so on, and seek to show that other aspects of the question and use of language can be explained in terms of the very same assumptions about the innate structure of the language faculty, in the same language and others, and that the same concepts play a role in other aspects of thought and understanding. One who holds that the connection is one of deeply held belief, not connection of meaning, has the task of developing a general theory of belief fixation that will yield the right conclusions in those and numerous other cases. One who holds that the connection is based on the "semantic importance" of sentences relating persuade and decide or intend (i.e., that these sentences play a pronominal role in inference, or serve to introduce the term persuade to the child's vocabulary, and thus are more important than others for communication) faces the task of showing that these empirical claims, which appear to lack any plausibility, are in fact true. The first task seems much more promising to me, but it is a matter of empirical inquiry, not pronouncements on the basis of virtually an evidence. The whole matter requires extensive rethinking, and much of what has been generally assumed for the past several decades about these questions appears to be dubious at best. There is, it seems clear, a rich conceptual structure determined by the initial stage of the language faculty (perhaps drawing from the resources of other genetically determined faculties of mind), waiting to be awakened by experience, much in accord with traditional rationalistic conceptions and even, in some respects, the so-called "empiricist" thought of James Harris, David Hume, and other empiricists.

I think we are forced to abandon many commonly accepted doctrines about language and knowledge. There is an innate structure that determines the framework within which thought and language develop, down to precise and intricate details. Language and thought are awakened in the mind, and follow a largely predetermined course, much like other biological properties. They develop in a way that provides a rich structure of truths of meaning. Our knowledge in these areas, and I believe elsewhere—even in science and mathematics—is not derived by induction, by applying reliable procedures, and so on, but is "grounded" on "good reasons" in any useful sense of these notions. Rather, it grows in the mind, on the basis of our biological nature, triggered by appropriate experience, and in a limited way shaped by experience that settles options left open by the innate structure of mind. The result is an elaborate, complex, and nonempirical systems, systems of knowledge and belief, that reflects the very nature of the human mind, a biological organism like others, with its scope and limits. This conclusion, which seems to me well-supported by the study of language and I suspect holds far more broadly, perhaps universally in domains of human thought, is in need of rethinking fundamental assumptions of modern philosophy and of our general intellectual culture, including assumptions about scientific knowledge, mathematics, ethics, aesthetics, social theory and practice, and much else, questions too broad and far-reaching for me to try to address here, but questions that should, I think, be subjected to serious scrutiny from a point of view rather different from those that have conventionally been assumed.

NOTES

1. For references, see below, and see my Knowledge of Language: Its Nature, Origin, and Use (New York: Praeger, 1975), for discussion, see my Aspects of the Theory of Syntax (Cambridge: MIT Press, 1965). Here the concept of E-language is put in the side, and the concept of language is put in the side, and the concept of language faculty (perhaps drawing from the resources of other genetically determined faculties of mind), waiting to be awakened by experience, much in accord with traditional rationalistic conceptions and even, in some respects, the so-called "empiricist" thought of James Harris, David Hume, and other empiricists.

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10. At least, if we are doing C-linguistics, with empirical content. If not, then further clarification is required. The inquiry is in any event not semantics in the sense of empirical semantics, a study of relations between the language and something extralinguistic.

11. On a personal note, my own work, from the beginning, has been largely concerned with the problem of developing linguistic theory so that the representations provided in particular languages will be appropriate for explaining how sentences are used and understood, but I have always called this "syntax," as it is, even though the motivation is ultimately semantic; see, e.g., my Logical Structure of Linguistic Theory (1955-56; published in part in 1975, New York: Plenum), Syntactic Structures (The Hague: Mouton, 1957). This work is correctly described as syntax, but it deals with questions that others incorrectly term "semantic," and it is, I suspect, one crucial way to study semantics.


SUGGESTED FURTHER READING


