Against Tacit Knowledge

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1. The problem

One of the most intriguing unsolved questions of cognitive science is to what extent its undeniable results in general and the results of linguistics in particular can be explained in materialistic terms.[1] Is it correct to describe the object of linguistic theories, as Chomsky does, as knowledge and as the characterization of brain mechanisms at a certain level of abstraction? It is a fact that generative linguistics has been very successful over the past thirty years but a further explanation of its results in terms of brain structure has been a near failure so far. I have no satisfactory answer to offer as to the "why" of this failure, but I do believe that the glimmerings of an answer have to begin with a rethinking of the standard Chomskyan account of the relation between generative theories and the brain.

According to the standard account our grammars are a form of knowledge that is in part innate. Moreover, the linguist's account of this knowledge is said to be an abstract characterization of brain mechanisms. More generally speaking, the standard account is a variant of the Cartesian representational view of knowledge that has been criticized by philosophers in the Wittgensteinian tradition. Recently, this tradition has led to the "anything goes" of postmodernism and to the total rejection of "knowledge as accurate representation" (Rorty 1980). Although I am too much influenced by Wittgenstein to fully accept the Cartesian view, I find it much less absurd than the "postmodern" view (to the extent that this view can be made sense of). A total rejection of representationism ignores everything that is currently known about cognition. Without accurate mental maps one cannot even find the restroom in a philosophy department.

What is wrong with much representationalism, however, is the tendency to identify structure and knowledge. This has only led to metaphorical practice such

[1] I would like to thank Harry Bracken, Marcel den Dikken, Edith Kaan, Charlotte Koster, and an anonymous reviewer for comments on an earlier version of this article. They all disagree with me in one way or another and can in no way be held responsible for any remaining errors.

as the ascription of knowledge to computers.[2] In a wider historical context, it has led to rather problematic notions such as "tacit" or even "innate" knowledge. Although I hate debates about what ordinary usage really implies, I think it is pretty clear that in normal life human knowledge is considered neither innate nor tacit. In ordinary usage, a person with knowledge of English is somebody who has acquired this knowledge after birth and who has access to what he or she has acquired.

The idea of tacit knowledge is at least as old as Plato's *Meno*, in which Socrates seeks to demonstrate that an uneducated slave has such knowledge of geometry. The argument is supposed to show that what becomes explicit knowledge through Socrates's interference, was already present as tacit knowledge in the slave's mind. However, the Socratic demonstration is also compatible with my own view that knowledge does not exist in abstraction from access and a cultural context in which conscious reflection plays a role. According to this alternative view it is Socrates who creates the necessary cultural context with its public dimension.

More generally, Plato's argument shows the same weakness as all later poverty of the stimulus arguments in that it mistakenly assumes that rapid acquisition of knowledge can only be explained on the basis of previous knowledge.[3] I think poverty of the stimulus facts only convincingly show that the human brain is not a *tabula rasa* at birth, it shows virtually nothing about the nature of our biological endowment. It certainly does not show that this endowment must be characterized as consisting of knowledge of some kind.

Contrary to what many linguists seem to believe, I think Wittgenstein has definitively refuted the view that knowledge (or meaning) is a species of representation. I quite agree with, for instance, Wittgenstein (1958) that the life of a sign is only found in its use and that the meaning of a representation is not a kind of shadow representation of that representation.[4] Similarly, knowledge is not a representation or the property of a representation but is only found in the **use** of

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[2] I agree with Searle that such forms of "strong AI" are refuted by his Chinese Room Argument: "A system, me for example, could implement a program for understanding Chinese, for example, without understanding any Chinese at all." (Searle 1990: 585).

[3] Poverty of the stimulus arguments seek to explain the (often rapid) acquisition of complex knowledge under conditions of little or no evidence on the basis of innate structure.

[4] I am not sure if I agree with Wittgenstein in other respects, because much of his discourse is obscure to me. To the extent that Wittgenstein has behavioristic inclinations, I would firmly side with Chomsky against him.

representations. The arguments in question have been too easily dismissed by Chomsky and others.

On the other hand, I also quite agree with Chomsky that knowledge can only be acquired by "finishing" innate structures and that it cannot be **reduced** to usage or some species of ability. The latter idea has not only failed to generate a research program in linguistics but also makes the success of modern linguistics a complete mystery.

One can of course deny the empirical success of Chomskyan linguistics, as is done by Baker and Hacker (1984), but such reactions only reflect the well-known fact that an adequate training in modern linguistics is hard to come by in Oxford.

So, from our point of view the problem we have to face is how the success of modern linguistics can be made compatible with Wittgenstein's critique of knowledge as representation.

2. The contextual dependence of representation

So far, we have encountered two extreme views as to the nature of knowledge. The Cartesian tradition, revitalized by Chomsky, tends to see knowledge as a species of representation, while philosophers in the Wittgensteinian tradition usually conceptualize knowledge as a species of ability. Both views are one-sided. Under the Cartesian view, it is not clear how knowledge can be distinguished from other, non-epistemological representations. It leads to dubious concepts such as innate or tacit knowledge.[5] If knowledge is a brain representation, it is difficult to avoid absurdities such as knowledgeable embryos. Even corpses could not be denied knowledge as long as the relevant structures remain intact after death (see also section **4.** below). Similarly, it would be sane under this view to say that the robots of General Motors have knowledge of car manufacturing.[6]

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[5] I am not saying that all the intriguing things that, for instance, Polanyi (1958, ch. 5-7) says about the tacit components of knowledge are dubious. I certainly agree that we cannot exhaustively express what we know. But I insist that it only leads to confusion if the concept of knowledge is extended to things beyond our awareness or even our potential awareness.

[6] Some readers of this article have expressed the view that there is no reason to deny knowledge to such robots. However, it seems to me that the rather common use of the term knowledge in computer contexts is purely metaphorical. If not, there would not be any reason to deny thermostats knowledge of room temperature or juke-boxes knowledge of the hit parade. A failure to recognize the

In the normal world, these robots only execute **our** knowledge of car manufacturing (which is not necessarily individual knowledge). The robots are only our tools, and so are the programs that belong to their inner representations. It seems to me that what holds for robots holds for all our hardware, **including our brains.** Thus, whatever representations we have in our brain can only be seen as tools, for instance of our knowledge. In the Wittgensteinian spirit, I believe that meaning and knowledge can only be found in the use of such tools. Perhaps in the same spirit, I believe that the "self" only exists in another kind of usage, namely in the living person's actual participation in history. As something realized in history, the self belongs to culture with its contingencies and therefore cannnot be reductionistically characterized by the non-historical natural sciences.[7] There is no more reason to believe that a person is his brain than that a person is his big toe, even if these two body parts make different contributions to one's identity.

The identification of brain representations with knowledge is based on the more general error of assigning an inherent significance to representations. In general, representations are meaningless and without purpose in abstraction from certain contexts. Thus, the patterns on laser discs are only representations of something in conjunction with conventions and decoding devices. The same type of pattern is a representation of music in conjunction with one type of output device and a representation of visual images in conjunction with another type of output device. Representations are relational by definition: they are only what they are as part of a wider context.

In the same vein, I believe that nothing in the brain has inherent significance. To the extent that brain structures are representations of something, they only have this status by connections with specialized perceptual or motoric mechanisms or by a programming process, i.e., by the fact that we have assigned them a place in our culture. I see certain similarities between programming a computer for WordPerfect and programming a child's brain for the grammar of English. In both cases, the essence of the process is giving an application to arbitrary structures on the basis of conventions that belong to our culture. In both cases the structure of the result is heavily constrained by the structure of the hardware. It is, of course, absurd to say that MS-DOS computers, analogous to Chomsky's

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metaphorical usages of the term knowledge leads, in other words, to an animistic world picture.

[7] See Bartley III (1985: 177 ff.) for a very interesting expression of this idea ("the human self, while no doubt in part resulting from inborn dispositions, is also at least in part held together by theories" (*op.cit.* p. 180)). As a theoretical construct, our "self" has no existence disjoint from our culture with its public dimension. See also Popper and Eccles (1977)

Universal Grammar, have a Universal Word Processing Scheme (UWPS) with open parameters: one parameter setting gives WordPerfect, another MsWord, another Volkswriter DeLuxe, and so on. The relation between computer hardware and its applications is arbitrary and conventional in the Saussurian sense. Something very similar holds, I assume, for our arbitrary brain structures and their application in natural languages.[8]

In sum, it is not only an error to characterize the innate brain structures underlying language as knowledge, it is also meaningless to say that "language" is the inherent purpose of the abstract structures that we detect in language. To the best of our knowledge, the physical world, to which our brain structures belong, is entirely meaningless. Everything we do with our brain, be it in mathematics, music, language, or whatever is based on human inventions. It is only by this contingent historical programming process that our brain structures can be a representation of the cultural phenomena in question. There is a biology of the brain, not a biology of language, of music, of mathematics, or of politics. Programming with its conventional aspect belongs to human culture. It is compatible with physical science but can by no means be reduced to it.[9]

I also believe it is a mistake to assume too close an identity between brain and mind. My brain is a limited physical structure confined in my skull. My mind involves the application of brain structure and is therefore not disjoint from the potentially infinite set of applications that we find in ever varying historical situations. It also cannot be sharply distinguished from the external memory that I share with others.[10] In other words, "mind" is something dependent on cultural

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[8] Although MS-DOS computers are probably less pre-structured for their applications than the human brain, the relation between structure and application is arbitrary in both cases. Language acquisition is not finishing Universal Grammar but giving arbitrary structures an application through the conventions given in our culture.

[9] It should be noted that I am not proposing some form of ontological pluralism. Anti-reductionism is compatible with ontological monism. Since biology involves notions such as "genetic code" and "natural history", it cannot be reduced to physics. Similarly, linguistics and all other forms of culture cannot be reduced to biology, since the latter science lacks the crucial notion of "arbitrary convention".

[10] It makes sense to distinguish a computer from connectable external memory storage, but at the level of application there is no relevant distinction between internal and external memory. Similarly, it makes sense to distinguish our brain from external memory storage such as found in libraries. But for the operations of our mind, it does not make a difference whether we retrieve

context, whereas "brain" is not. The brain is like the laser disc discussed before: its meaningless structures can represent arithmetic in one context of application and language in some other context of application. My mind is not just my brain, but my brain **programmed and used in certain ways**.[11]

This is not to say that we exploit the same type of structure in all applications. In fact, I believe that only a very limited set of structures can efficiently be used in the application that we call language. The issue of arbitrariness should not be confused with the issue of plasticity. For many purposes, our brain seems to leave us very little choice. So, I agree with Chomsky that poverty of the stimulus arguments point in the direction of rich innate structure. I strongly disagree, however, with the common characterization of these structures as knowledge in abstraction from the convention-driven application of these structures in language use.

What I would like to propose, then, is a synthesis of Chomskyan and Wittgensteinian (and also Saussurean) ideas. Meaning and knowledge are caused by rich innate structures (Chomsky), but only obtain their status as meaninig and knowledge in the contextual use of these structures in human language games (Wittgenstein). This is the only view I can think of that does justice to poverty of the stimulus arguments while avoiding the absurdity of attributing knowledge to embryos, corpses, and robots.

3. The distinction between knowledge and its causes

To avoid misunderstanding, I would like to stress that, with some qualifications to be made in section **5.**, I fully agree with the important Chomskyan idea that humans have a recursive generative grammar represented in their brain. At this point, I am only taking issue with the in my view mistaken idea that the grammar represented in the brain is a form of knowledge. Chomsky usually concedes that it differs from normal knowledge in that it is tacit and that critics might speak about "cognize" instead of "know" for this form of knowledge. The usual further suggestion is that this is a rather empty debate about words, that the ordinary usage of "know" is perhaps incoherent, and that "cognize" is sufficiently close to

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information from our brain tissue or from a library.

[11] Some readers happen to interpret my conventionalism as a form of relativism and a denial of a biologically constrained human nature. This is a serious misunderstanding, because I believe that not only language, but also music, mathematics, and other forms of culture are only possible on the basis of heavily constrained innate structure, which is more or less uniform across the species.

"know" in the ordinary sense that continued use of the term "knowledge of language" is justified (see for instance Chomsky 1980 and 1986).

Personally, I find Chomsky's standard dismissal of the critique of his knowledge concept unsatisfactory because, clearly, there is no kind of identity relation between what we cognize and what we know but, sometimes, at best a causal relation. Cognizing something is perhaps necessary but certainly not sufficient for knowing something. In other words, it could be that Chomsky's arguments confuse knowledge with its causes.[12]

The point can be illustrated with elementary examples. Linguists, both amateurs and professionals, know that in English the article precedes the noun. Thus, (1a) is correct, while (1b) is deviant:

(1) a the house
b *house the

A generative grammar of English represents this fact. There can be little doubt that there also is a corresponding representation in the brain. What else than a brain representation could guide the speakers of English to use the order of (1a) rather than that of (1b)? The brain representation in question does not seem of a different kind than the instructions represented in computer programs that answer questions in correct English. I cannot think of a convincing argument as to why humans using a grammar differ in principle from computers using a program. Just as computers have no knowledge of their programs, most humans have no knowledge of their grammars.

Knowledge, however, is something that makes humans different from computers. It can only be obtained in a context of conscious reflection. So, some people know that articles precede nouns in English (like in 1a), but most people do not. In fact, most people don't even know what articles and nouns are.

This argument can, of course, not be countered by pointing out that every speaker of English gives the right answers if asked to compare (1a) and (1b). By asking questions, one acts like Socrates in Plato's *Meno* and clearly introduces a context of conscious reflection. Whatever is tacit ceases to be tacit upon conscious reflection. It is therefore impossible to prove the existence of tacit knowledge by

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[12] Harry Bracken (personal communication) has pointed out the following problem: "If the knowledge I *exhibit* of a rule of English grammar is 'caused' by my cognizing some principle of UG, where is the flaw?" It should be noted that "cognized" representations are never the sole cause of knowledge in my view. Knowledge is caused by representations only in conjunction with the access mechanisms that put the representations to use.

asking questions. I am afraid that this logical flaw in the *Meno* argument is simply repeated by Chomsky from time to time.

Similar points can be made on the basis of more complex examples, such as (2a) and (2b) discussed by Chomsky (1992):

(2) a Mary expects to feed herself
b I wonder who Mary expects to feed herself

These are interesting examples because they both contain the sequence "Mary expects to feed herself", but the interpretations are very different. As Chomsky points out, in (2a) *feed herself* is taken to be predicated of *Mary*, but in (2b) it is predicated of some (female) person distinct from *Mary*. Most speakers of English would agree with these judgments. But notice that to the extent that we know these facts, our knowledge is far from tacit. It only comes about in a context of minimal conscious reflection and therefore it is knowledge in the normal, impeccable sense of the term.

It is also impeccable to explain the difference between (2a) and (2b) on the basis of properties of a generative grammar and to postulate that speakers of English have represented something related to this grammar in their brain. But giving this brain representation the status of knowledge is again the same error that we met before: it confuses the knowledge we have of the difference between (2a) and (2b) (upon conscious reflection) with its main cause (namely our possession of a program-like brain representation).

All this confusion is just the latest variant of Plato's original sin: the idea that knowledge consists of copies of previous knowledge. This previous knowledge can consist of the heavenly ideas and their tacit copies in our minds (Plato) or of the innate ideas postulated by Descartes. In all cases we find a kind of epistemological preformationism that has as little merit as the now discredited preformationism in genetics. It seems to me that there is no more reason to assume that the origin of knowledge is knowledge-like than there is reason to believe that the origin of organisms is organism-like.

Knowledge, it seems to me, can only be obtained by combining the meaningless structures of our brain and placing them in a meaningful context under control of our consciousness. That is, neither meaning nor knowledge exists outside (the possibility of) concrete language games.

4. Knowledge possessed by the dead

Another often repeated argument of Chomsky's is directed against the supposedly Wittgensteinian idea that "knowing a language" is a species of ability. I have

already mentioned that I agree with Chomsky that "knowing a language" cannot be exclusively reduced to "having some kind of ability". But on the other hand I fail to see how anybody could deny that "knowing a language" crucially involves "ability" in ordinary usage. Thus, if we say that Jones knows English we clearly not only want to say that he has something internalized but also that he knows **how** to speak and understand English. In ordinary usage "knowing a language" is closer to "knowing how" than to "knowing that" in most cases.[13]

I am therefore puzzled by one of Chomsky's standard arguments against the idea that "knowing a language" is essentially (also) an ability:

> "To see why this is so, suppose that Jones, a speaker of what we call "English" in informal usage, improves his ability to speak his language by taking a public speaking course, or loses this ability because of an injury or disease, then recovering that ability, say, with a drug. Note that a speaker of Japanese, under the same circumstances, would recover *Japanese*, not English, with the same drug, and plainly recovery in such cases differs radically from acquisition; a child could not acquire English or Japanese without any evidence. In all such cases, something remains constant, some property K, while ability to speak, understand, etc. varies. In ordinary usage, we say that K is knowledge of language; thus Jones's knowledge remained constant while his ability to put his knowledge to use improved, declined, recovered, etc. The account in terms of a generative procedure accords with informal usage in this case. Note further that other evidence (say, from autopsy, were enough known about the brain sciences) might lead us to conclude that Smith, who never recovered English, not having taken the drug, nevertheless retained his knowl- edge of English intact having completely lost his ability to speak and understand." (Chomsky 1992).

I fail to see how this argument establishes what it is supposed to establish, in spite of the fact that I fully agree with Chomsky that knowledge of language involves something relatively constant and independent from use (Chomsky's property K). My disagreement concerns the further conclusion that in ordinary usage K is knowledge of language: no ordinary language user would ever say that somebody who has completely lost his ability to speak and understand English

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[13] This is particularly true for grammar. Our lexical knowledge also involves a relatively substantial amount of "knowing that". So, from an epistemological point of view, language is very heterogeneous in an as yet hardly explored way.

(for instance, by passing away) has "knowledge of English". The dead, so it seems, have no knowledge whatsoever.[14]

In fact, the cited argument gives more credibility to the opposite, by now familiar point, namely that knowledge is not a representation, but the result of at least the conjunction of a representation and an ability. No knowledge without representation, but certainly no knowledge without ability to use either. If current linguistics is correct, then somebody who knows English has selected a generative grammar **and** acquired the ability to use it. That people differ in their ability is certainly true but irrelevant. People also differ in the richness of their representations, in part depending on the module we consider. As for lexical representation, for instance, there must be enormous differences.

5. Conclusion: the linguistic code

Modern heirs of Wittgenstein tend to ignore or even deny the representational aspects of language and knowledge, but Chomsky, on the other hand, tends to deny the fact that representations are meaningless outside a context of use. The Chomskyan view is perhaps a variant of mainstream Western philosophy since Plato, which maintains that representations are significant independently of their use. This metaphysical idea exists in a heavenly ontological variant (Platonism) and in a secularized epistemological variant (most Western rationalism since at least the days of Descartes and Kant). Arguably, Frege is more in the latter than in the former tradition.[15] In current linguistics, the Platonic variant is found in the recent writings of Jerrold J. Katz.[16] The epistemological, psychologistic variant is found in Chomsky's work and also in Katz and Fodor (1963).

Another well-known modern philosopher who believes that representations, as for their significance, can stand on their own feet is Karl Popper. In his *Objective Knowledge* (1972) he maintains that the propositions of science have a truth value

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[14] Edith Kaan has drawn my attention to the fact that somebody who falls asleep is not said to have lost his knowledge. This is consistent with my view, since, unlike death, sleep leaves **the ability to use** representations intact. I define knowledge as the combined product of representations and access mechanisms. This is more or less in accordance with (non-metaphorical) ordinary usage, which makes, however, no clear distinction between actual and potential access.

[15] According to Sluga (1980), Frege's philosophy is closer to Kant than to Plato. Thus, Frege's anti-psychologism does not necessarily contradict the Kantian idea that objectivity is in part grounded in the limitations of the human mind.

[16] See for instance Katz (1990)

independent of their use by some subject. This view is problematic because the truth value of a proposition depends on its interpretation. Interpretations, however, are not fixed properties of propositions, but creations of the user of the proposition on the basis of context and accidental knowledge.

In general, these variants of mainstream Western philosophy seem to be inspired by a fear of subjective relativism. Thus, Fodor (1990: xii) is quite explicit about his motives: "I hate relativism. I think it affronts intellectual dignity". Similar motives can, with some plausibility, be ascribed to Plato against the sophists, Descartes against the sceptics, and Chomsky against the behaviorists. I share the concerns of these philosophers, and yet I believe that their essentialist reactions are in error for reasons familiar since the later Wittgenstein.

The appreciation of the best Wittgensteinian ideas is impeded by their embedding in an often obscure discourse. To make things worse, several heirs of Wittgenstein seem to give justification to Fodor's fears. Thus, postmodern relativism has led to the irrational "anything goes" of Feyerabend (1975) and to the undeserved rehabilitation of Heidegger in Rorty (1980). Where representations lose their objective significance, there certainly seems to be a danger of what the late Imre Lakatos used to call mob psychology: the idea that truth is the right of the strongest.[17]

Nevertheless I believe that Wittgenstein in his clearer writings, such as *The Blue and Brown Books* (1958), has given the death blow to the idea that meaning and knowledge are forms of representation. If Wittgenstein is right in insisting that the meaning of representations can only be found in their use, then meaning and knowledge cannot be fully explained in scientific terms. I do not find this conclusion less rational than Kurt Gödel's conclusion that not all of mathematics can be formalized.

It is, incidentally, questionable whether Wittgenstein himself was a relativist. According to Haller (1988: 126) it is the case according to Wittgenstein "[...] that *facts of our natural history* ultimately constitute the foundation of human speech as well of human knowledge [...]." The idea that meaning and knowledge are only found in use is by no means incompatible with the idea of a fixed and richly structured human nature in the biological sense.

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[17] See for instance Cohen, Feyerabend, and Wartofsky (1976). In general, I believe that such fears are exaggerated and that representations without fixed, objective properties neither lead to subjectivism nor to relativism. Texts may be subject to Peircean unlimited semiosis in principle but hardly in practice (see Eco (1992) for discussion). Also, it is possible to maintain truth as an absolute regulative idea and to treat the propositions of science as having an objective meaning by hypothesis. Possible differences in interpretation will then become manifest in the course of the testing process.

It is my conviction that Chomskyan linguistics has contributed much to the foundations of the idea of a fixed and richly structured human nature. But somehow the dubious interpretation of the results of linguistics as a form of knowledge seems to stand in the way of an appropriate interpretation in terms of the brain sciences.

As long as we look for the representation of knowledge of language in the brain, it is highly unlikely that we will ever find something. What we should look for, I believe, is information structures that control use, that is, the structures that guide us in speaking and interpreting sentences. These structures could be very remote from what linguists describe in their theories. What I have in mind is something analogous to DNA, perhaps the best understood natural information structure. The distance from DNA to actual organisms is enormous. DNA only "represents" organisms in conjunction with the long decoding process we find in embryonic development. More often than not, representations are hardly informative about what they represent in isolation. Nobody would deny, for instance, that "time" is one of the most important aspects of music. Remarkably, neither records nor tapes represent this essential aspect of music. It is, so to speak, not in the programs, but only "added" in the execution of the programs: by the speed in which records or tapes are played.

Similarly, I consider it highly unlikely that the linguist's structures have a direct structural parallel in the brain. Perhaps, the ultimate programs are as elementary as DNA so that much of linguistic structure results from the decoding process in actual speech or interpretation. All this is intended to be taken literally: the ultimate representations responsible for speaking and interpreting are hypothesized to be coded information like DNA and to have as little to do with knowledge of language as DNA has to do with knowledge of organisms.

Similar conclusions can be drawn for cognitive science in general. What we study is not knowledge but the more robot-like aspects of human beings, namely the natural programs (information structures) that direct our behavior and perception. Of course, these programs also show up in our knowledge of them, but knowledge only originates upon conscious reflection and will only be the indirect topic of cognitive science in so far as we study some of its "robotic" causes.

If natural language use is not based on knowledge but on a code, it becomes much more urgent to investigate the actual decoding processes that we find in speaking and interpreting. It is my hope that the proposed shift in focus from knowledge to codes will lead to a more realistic and fruitful cooperation between linguists and brain scientists.

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