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ON LANGUAGE AND EPISTEMOLOGY*

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1. On world 3

In this short article, I would like to sketch an alternative to Chomsky's interpretation of the relation between language and epistemology. In Chomsky's interpretation, language mainly exists at the level of individual psychology, while according to my alternative, language primarily exists at the level of human culture. My own view is based on a modified conception of Popper's world 3, the world of human knowledge and culture. Some emphasis must be put on the word "modified" here, since I strongly disagree with Popper's ontology and semi-Platonic interpretation of world 3. In spite of my rather fundamental disagreement with Popper, I believe that a modified conception of his world 3 can be very illuminating for the issues at hand.

Popper (1972, chs. 3 and 4) advocates a variant of ontological pluralism according to which reality is divided in three distinct and autonomous "worlds." World 1 is the world of physical entities, world 2 is the world of mental states, and world 3 is the public world of human culture and knowledge in the objective sense. An ontological tripartition of reality along these lines leads to numerous problems of interpretation, most of which I will leave for what they are. Personally, I do not see the slightest reason for an ontological division of our world. I am. for instance. skeptical about an ontological distinction between the worlds 1 and 2. The distinction in question is a version of classical mind-body dualism, which has been one of the major sources of irrationalism in the history of Western thought. Mind-body dualism has been particularly harmful in combination with the epistemological dualism according to which mental phenomena must be studied in a way totally different from what is usual in the physical sciences.[1]

I agree with Chomsky (1988) that the mind-body problem escapes a coherent formulation because of the fact that the notion "body" is open and evolving. Our notion of "body" is entirely different from Descartes's and it is unclear whether what is known about the mind can be incorporated in our current theories of physics or in some future extension of them.[2] As it stands, mind-body dualism is perhaps an unmotivated prejudice and not a well-defined problem.

A similar scepticism can be formulated with respect to Popper's distinction between the worlds 2 and 3. One problem is that as for world 2, Popper is extremely vague. Originally, Popper defined world 2 as "the world of consciousness" (Popper 1972). Since this is an all too obviously inadequate conception of the human mind, Popper also included "unconscious states" in his later versions of world 2 (see Popper and Eccles 1977, 38).

In spite of such improvements, it is not clear whether a sharp distinction can be made between the human mind and human culture in all domains. The crucial problem in making such a distinction is the role of human memory.

Before going into the role of memory, I would like to make a few remarks about Popper's Platonism. Popper's epistemology is Platonistic in that it seeks to disconnect the content of human knowledge entirely from the human subject. Popper (1972) stresses throughout that the objective knowledge of his world 3 is "*...knowledge without a knower: it is knowledge without a knowing subject*" (Popper 1972, 109). Popper tries to clarify this notion by two thought experiments. According to the first thought experiment, all subjective learning is destroyed, but "*...libraries and our capacity to learn from them...*" survive (Popper 1972, 108). According to the second thought experiment, our subjective learning is destroyed again, but this time also all libraries are destroyed. Popper states that these thought experiments clarify the significance and autonomy of world 3 (the libraries). In the second case, in which the libraries are destroyed, our civilization would not re-emerge for many millennia.

Clearly, the thought experiments do not establish what Popper seeks to establish ("knowledge without a knowing subject"). In fact, they establish exactly the opposite since even Popper can only talk about the relevance of libraries by explicitly speaking about "our capacity to learn from them." What else could this capacity be than the capacity of a knowing subject?

That the knowing subiect cannot be eliminated from the concept of knowledge becomes even clearer when we conceive of a third thought experiment. One of the blessings of modern military technology is a device called the neutron bomb, a weapon that kills people but leaves libraries intact. Suppose that mankind would be wiped out by such a device and that our libraries would survive. One wonders how many millennia it would take for Popper's civilization to re-emerge.

"Knowledge without a knowing subject" is a metaphysical, Platonic fantasy about something that does not belong to this world. Popper's man-made variant of it is just the latest version among many, mainly 19th century German attempts to secularize Platonism. Popper's predecessors in this respect are "anti-psychologistic" thinkers like Bolzano, Lotze, Frege, and Husserl.[3]

Popper's main motivation seems to be his fear of subjectivism in epistemological matters. It seems to me that this fear is hardly justified. What we find in libraries and other forms of the public record can only be seen as knowledge in conjunction with a human interpreter. This does not mean, however, that we must think of any particular individual. Given the fact of a fixed human nature, we can refer to the public record as "human knowledge" by implicit reference to a conjunction with a human interpreter in abstraction from individual differences. Subjectivism, in other words, is by no means the only alternative to (semi-)Platonic objectivism.

I would now like to turn to memory and the problems it creates for the concept of mind. What humans and intelligent machines have in common at an appropriate level of abstraction is that they can be described as a combination of a processing unit and a memory. The memory can be "internal" or "external", and the external memory is in principle non-finite. In Chomsky's words:

> We are like a Turing machine in the sense that although we have a finite control unit for a brain, nevertheless we can use indefinite amounts of memory that are given externally to perform more and more complicated computations. (Chomsky, Huybregts, and van Riemsdijk 1982, 14).

An essential property of the external memory is that it is non-personal. It can be combined with any control unit, so to speak. The nature of possible external memories is constrained (but not necessarily defined) by what is processable by the control unit. In that sense, possible human external memory falls within the innate limits of the human mind. But the actual content of the external memory is a matter of historical accident and it is transferred from one generation to the next by non-genetic means.

The existence of a non-personal, supra-individual external memory makes it unclear what the boundaries of the individual human mind are: The problem is that we know from computer technology that there is no principled distinction, let alone an ontological distinction, between internal and external memory. Computers can be manufactured with more or with less internal memory. What is missing from the internal memory can be compensated by the external memory. Furthermore, information from external memories can freely be loaded into the internal memory of a machine. Similarly, internal memory contents can be "saved" in external memories. What is internal or external memory is not a matter of ontology but of technological options and accidental circumstances.

As for human minds, the situation is not fundamentally different. Aspects of the public record, such as the content of books, can be "loaded" into the individual memory and vice versa, we can give some external encoding to our internal memory contents. An individual's memory content is -fortunately- largely private, but again this is not an ontological fact but a technological fact. It is easily conceivable that pernicious technology will be developed that makes the private memory publicly accessible.

If the distinction between internal and external memory is arbitrary, it becomes very difficult if not impossible to make a principled distinction between the human mind and human culture in certain domains. Of course, each individual's internal memory contains only a selection of the external public record, but the point remains the same: there are no human minds disjunct from the public record.[4]

The upshot of this situation is that it seems best to describe both the human mind and human culture in relational terms. Human culture consists of those encodings that can be processed by the human mind, and the human mind is a device for the processing of a supra-individual public record.

With this much in mind, we can use Popper's terminology without accepting his ontology. My modified world 3 is, like Popper's, the world of human culture. To the extent that this is a world of knowledge, it is the external memory of mankind. In fact, it only contains knowledge in conjunction with any individual's processing capacity. It is non-Platonic in the sense that it is nothing -or arbitrary matter at best- without a knowing subject.

Likewise, I think there is room for a world 2 concept. It concerns those aspects of the human mind/brain that do not involve external memory in any sense. It is the part of the human mind that is genetically determined and that in no sense depends on the non-genetic information transfer that is typical of world 3 in my sense. Both my world 2 and 3 are not ontologically distinct autonomous worlds but two aspects of reality monistically conceived.

Before turning to language, I would like to further clarify the nature of my worlds 2 and 3 and their interaction. The main difference between the worlds 2 and 3 is that world 3 crucially involves historically accidental information that is transferable by non-genetic means. In that sense, this world is beyond the strictures of biology as normally conceived. Of course, this does not mean that world 3 is not determined by human nature in the biological sense. I already concluded before that human external memory is limited to what is processable by humans. In that sense, world 3 is determined by the biologically defined world 2. But the biologically possible external memory-content is much too large to be of any value for human life. The point of world 3, then, is that it gives a very limited selection of the biological possibilities on the basis of historical experience.

Another way to characterize world 3 as the world of human culture is by saying that it contains all aspects of our world that integrate properties of our genetically determined biological nature with the historical, non-genetically transferred public record. It is the world of application of the resources of our biologically given mind/brain to materials of the public record.

In my view, the relation between world 2 and world 3 is asymmetrical. By studying the products of our culture (world 3) we can learn something about world 2, the biologically given world of the mind/brain. The opposite, however, does not hold. There is no reason to assume that anything in world 2 refers to world 3. Another way to express this is by saying that the structures provided by our biologically given mind/brain are uninterpreted with respect to human culture at the moment of our birth. What the upgrowing child learns, among other things, is how to interpret its innate structures with respect to domains of world 3 objects. By giving an interpretation to innate structures, certain aspects of culture can be learned very rapidly, without much evidence. Plato's problem, then, is solved in my view by the fact that much of the content of world 3 is pre-structured (but uninterpreted) at the level of world 2.[5]

Only world 2 is the world of individual psychology in the strict sense. Contrary to world 3, it entirely abstracts away from the supra-individual public record, the non-personal external memory. We can talk about world 2 in mentalistic terms or in physical terms. Like Chomsky (1988), I believe that mentalistic descriptions of the mind are descriptions of the brain in abstraction from mechanisms.[6]

Given what is said so far, it will be clear that language is a world 3 phenomenon in my opinion. Obviously, it is a phenomenon that integrates aspects of the mind/brain (world 2) with elements from the public record (such as words). By definition, such phenomena belong to world 3. In that respect, language is on a par with mathematics, painting, music, and all other aspects of our culture. All these phenomena are constituted by a certain mix of innate structures and elements from the public record. That in the case of language, say, 90% is due to our biologically given nature and in the case of music, say, only 60% is totally irrelevant as to the status of these phenomena. Certain cultural phenomena are almost entirely biologically pre-structured, while others are only marginally so. The composition of the mix differs from case to case and there is by no means anything like a cut-off point between domains that belong to culture and domains that belong to individual psychology. All domains of human achievement that involve elements from the public record belong to culture (world 3) and are only indirectly informative about individual psychology (world 2).

Obviously, language is among the cultural phenomena that are most informative about the mind/brain. This is so because there is little doubt, in my opinion, that language is among the most highly biologically pre-structured phenomena of human culture.

2. Does Universal Grammar exist?

In his metatheoretical essays of the last ten years, Chomsky has emphasized the lack of similarity between natural language and artificial languages. Artificial languages consist of a set of well-formed formulas, which can be characterized in any arbitrary way. For natural languages, in contrast, there is no non-arbitrary way to select a set of well-formed formulas. Generative grammar in Chomsky's sense is not about a given set of sentences (E-language). but about the various modules which together constitute knowledge of language (I-language). This I-language enables someone to assign a structural description to any string of words.

Chomsky's criticism of the concept of E-language in the study of natural language is quite convincing in my opinion. It is indeed impossible to specify a given set in the natural world that counts as "the" language. From my own perspective, the concept of E-language is also beyond "individual psychology" in that E-languages are built up from elements of the public record (namely words). In short. E-languages are artificial, cultural objects in at least two respects: they are selected on the basis of an arbitrary decision, and they are built up from artefacts (words).

The shift from E-language to I-language has been very important in that it has done away with the misleading analogy between artificial languages and natural language. But if we are interested in individual psychology, the concept of I-language is still inadequate in an important respect. The problem is that it does not abstract away from the public record, from the lexicon in this case. Universal Grammar, the initial state of language acquisition, specifies levels of representation like D-structure, S-structure, and LF. These levels cannot be distinguished in abstraction from the content of lexical items. This leads to the paradox that on the one hand Universal Grammar has levels which can only be distinguished on the basis of lexical properties, while on the other hand the initial state (UG) clearly is a state without lexical items. After all, lexical items are not even acquired during the first year of life.

In my alternative view, the problem does not arise, since I assume that the structures provided by the biological mind are uninterpreted at birth. This is just a special case of my general idea that world 2 structures have no world 3 interpretation before actual contact with the public record.

It seems to me, then, that the current standard interpretation of generative grammar is based on an unproven and even implausible assumption. This assumption is that certain world 2 structures are predestined to have a specific world 3 interpretation Without this assumption, it would not make sense to refer to the initial state of the computational part of language as Universal Grammar or I-language with open parameters. If the structures in question are uninterpreted, there is no connection with language at all. This is, in fact, my thesis: Universal Grammar is an inadequate concept because there is no reason to assume that the structures of the initial state are biologically predestined for language. Language only results from the application of the structures in question to meaningful elements of the public record. There is no known principle of biological necessity that establishes an intrinsic connection between the initial state and its world 3 application.[7]

It should be noted perhaps that the issue at hand is an empirical one. There is, as far as I can see, no logical reason to assume that world 2 structures are "free" with respect to world 3. It is conceivable that world 2 structures have an intrinsic world 3 function after all. This is, however, not taken as an open empirical question but just taken for granted in the standard interpretation of generative grammar. No one has really tried to clarify what it means for structures of the biological mind to have a fixed cultural purpose. Personally, I find it extremely unlikely that there will be such fixed purposes. The reason is that many structures of the mind show properties such as iteration and symmetry that we also find in non-living matter.[8]

It should also be noted that nothing of the available evidence favors the standard interpretation over my alternative. Poverty of the stimulus arguments do not distinguish the two positions, since both assume a rich innate structure. The difference is that this innate structure is "pre-interpreted" in the standard view, while my own innate structures are only interpreted after birth, by exposure to the public record.

Similarly, the fact that language acquisition is rapid and uniform does not favor the standard interpretation. According to both views, the structures of the mind differ in accessibility. Given such limitations of the mind, it is to be expected that only those structures are used that are readily available.

A last point that I would like to stress is that I am not really advocating an approach to language in terms of general intelligence or cognition. I assume that the contents of the mind are rich and diverse. Some structures will be most apt for application to one world 3 domain, while others will be more suitable to another domain. It is entirely conceivable that world 2 structures have a suitable interpretation in exactly one world 3 domain. Such world 2 structures will then be task-specific in the trivial sense that there are no other applications. Clearly, however, this does not establish a biologically necessary relation between structure and application. Without further evidence, the relation between structure and application must be considered arbitrary and established by non-genetically transferred world 3 instructions.[9]

As a matter, of fact, there is some evidence that aspects of the computational. part of language are not entirely domain-specific. Chomsky has pointed out. that both language and arithmetic presuppose the ability to deal with discrete infinities (which are recursively definable).[10] Remarkably, apes have been shown to be unable to learn either the recursive aspects of language structure (Terrace 1979) or counting, which also involves recursion (Premack 1976. 262). This is very suggestive evidence for the biological relatedness of the recursion that shows up in language and the recursion showing up in arithmetic.

Chomsky (1988) concludes from this that certain aspects of mathematics are derived from the language faculty. It seems to me, however, that the evidence is also compatible with an alternative interpretation. According to this alternative, the biological mind has an uninterpreted capacity to deal with infinite sets of discrete elements. Applied to one world 3 domain (meaningful words), this might give the computational dimension of language. Applied to another world 3 domain, this might give arithmetic. According to this alternative, language has no epistemological priority over arithmetic.

Staal (1986) gives some other interesting facts that can be interpreted as evidence for the hypothesis that the computational aspects of language are not entirely domain-specific. Staal

argues that the structures found in the mantras of the Vedic ritual in India show great similarity to certain structural aspects of language. Again, we may be witness to a manifestation of the mind's capacity to deal with discrete infinities in a certain manner.

Staal gives historical priority to the Vedic ritual and assumes that it is the origin of language. A major difference between the ritual and language is that the discrete elements in the ritual structures are meaningless, while the words of language are meaningful by their connection to other conceptual systems. Like in the case of mathematics and language, I do not see why we should give epistemological priority to one or another manifestation of the mind. It could just as well be that both the ritual and the relevant computational aspects of language are alternative world 3 manifestations of the same uninterpreted world 2 principles.[11]

I conclude, then, that the mind/brain in the biological (or individual-psychological) sense provides us with a rich and varied array of uninterpreted structures. Perhaps the most essential capacity of the human mind is the capacity to deal with infinite sets of discrete elements in a certain manner. The notion "discrete element" can be taken as a variable here, the values of which can be fixed at the level of world 3, the level of human culture. Fixing the values of the variables is an accidental historical step. It is, as far as I can see, not determined by any kind of necessity, biological or otherwise, and as such perhaps an essential aspect of human freedom.

3. Some consequences and further perspectives

It is sometimes assumed that my alternative interpretation of the relation between language and mind has no consequences for the research program of generative grammar. Such a conclusion would be based on a misunderstanding of my book Domains and Dynasties (1987a), which is an attempt to formulate a conceptually modified execution of the research program. It is perhaps unavoidable that something new and unfamiliar is misunderstood in terms of the older conceptual foundations. It is generally assumed, for instance, that everything hinges on S-structure in my framework, at the cost of D-structure and LF.

My actual point, however, is that none of these three notions (S-structure, D-structure, and LF) makes sense at the level which is usually -and misleadingly- called Universal Grammar. As indicated in the previous section, the conceptual weakness of the standard interpretation of generative grammar is that it describes world 2 structures in terms of their world 3 interpretation. This leads to the mistaken idea that language can be studied in terms of individual psychology. Other manifestations of the same mistaken idea are the concepts of a biologically given Universal Grammar, I-language, or language faculty.

Since language is a world 3 phenomenon belonging to human culture, there is not such a thing at all as a biology of language or an individual psychology of language. As long as we are interested in the mind/brain in a strictly individual sense, we should forget about the notion "language" altogether, both in its interpretation as E-language and as I-language. The underlying faculties of the mind/brain that make language possible have, as far as we know, nothing to do with language in a biological or strictly individual-psychological context.

But of course we can study world 3 phenomena to learn something about the underlying biological or individual-psychological mechanisms. In order to do so, we must postulate structures that abstract away entirely from elements of the public record (the external, non-

individual memory). In the case of language, this means that the underlying structures must be studied in abstraction from the lexicon, since the lexicon is the main ingredient from the public record in language.[12]

What I have called the configurational matrix, the invariant core underlying language in Domains and Dynasties, is such an attempt to formulate a lexicon-free basis for language. The recursive structures of X-bar theory can easily be formulated in abstraction from their application to lexical categories (in fact, this is already done by saying that X is a variable that can have the values V, N, A, and P). The thus defined hierarchical pattern suffices for the definition of core notions like "government", "c-command", and "locality". In this way, a recursive, hierarchical base can be defined, the nodes of which can be connected in the very typical and specific ways of the human mind. Since this basic pattern abstracts away from the lexicon, levels like S-structure, D-structure, and LF cannot be distinguished.[13]

The configurational matrix defines an uninterpreted pattern provided by the mind/brain. It has nothing to do with language and can therefore not be characterized as Universal Grammar or I-language with open parameters. The configurational matrix only shows up in language because the variables of abstract X-bar theory are substituted by lexical categories, which establishes a link with the public record, and which gives the domain-neutral configurational matrix a world 3 application.

All in all it seems to me that Domains and Dynasties gives a genuinely alternative execution of generative grammar based on an alternative interpretation of the relation between language and mind.

The alternative interpretation was inspired by Popper's world 3 concept, ultimately by the 19th century critique of psychologism in logic, mathematics, and linguistics.[14] This critique, however, usually led to some secularized form of Platonism. Popper's conception of world 3 is just the latest variant and most radical secularization in that it makes Plato's heaven man-made. But also Popper's version remains Platonic to the extent that his world 3 is ontologically disconnected from the human mind.

My own conclusion is that "world 3" is a very illuminating concept as long as we do not define it metaphysically, as something disconnected from the human mind, but as something connected with the human mind, namely as the supra-individual external memory.

By modifying Popper's world 3 concept in this way, we can still make an illuminating distinction between the world of human culture and the strictly individual world of the mind/brain, i.e., a modified world 2 that abstracts away from the public record.

It seems to me that by demystifying Popper's world 3 concept, we can also still make use of all its epistemological advantages. I can, for instance, whole-heartedly endorse Popper's critique of Brouwer's intuitionism in mathematics (Popper 1972, ch. 3). Intuitionistic constructivism is another way to escape from the otherworldliness of Platonism, since it reduces mathematical knowledge to a form of self-knowledge of the knowing subject. Popper rightly criticizes this approach as a form of subjectivism that ignores the relevance of the public record (world 3) in the development of mathematics. Like language and other manifestations of our culture, mathematics cannot plausibly be reduced to world 2. In all cases, the relevant phenomena come only into existence by crucial involvement of the public record, which contains non-individual elements by definition. The public record contains

crucial information from our cultural history constitutive of knowledge of language and mathematics.

Chomsky's approach to language is akin to Brouwer's intuitionism in mathematics (with a possibly different position with respect to subjective idealism).[15] In both cases, too much emphasis is given to the individual mind at the cost of the public record. In both cases. a conceptual reinterpretation in terms of the world 3 concept seems in order.

NOTES

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[1] The study of the mind has lagged far behind the natural sciences in our civilization, especially since the 17th century. Given the success of current generative grammar, this cannot be entirely due to inherent problems in the study of mental phenomena. Chomsky (1980) criticized the role of epistemological dualism in this negative development ("the bifurcation thesis"). Epistemological and ontological dualism cannot be seen in isolation, in my opinion, from the heavy dualistic bias of the Christian tradition with its ancient Manichaean residues. According to Manichaeism, the "higher" mental sphere is totally disconnected from the low and evil world of matter (to which the body naturally belongs).

[2] It must be noted here that ontological monism should not be confused with a belief in reductionism. Biology (part of my world 2, see below) differs from physics (world 1) by the concept of genetically encoded information. This is a barrier to reductionistic physicalism but not to ontological monism.

[3] Popper himself mentions Bolzano and Frege. Both Frege and Husserl were heavily influenced by Lotze with his ideas about "Platonism without a heavenly realm," as Husserl (1900/1901) put it. For Lotze's influence, see De Boer (1966). See also Laudy (1988).

[4] This is a rather crucial point. Internalizing some element from the public record does not entail a switch from culture to individual psychology. The non-genetically encoded elements of human culture can be internal or external to the individual memory. This does not make any difference as to their status. Language is a cultural phenomenon consisting of an inventory of elements and an instruction (implicitly taught by examples) to connect elements from the inventory to certain computational facilities of the mind. Both the inventory and the instruction belong to the public record (world 3). The fact that an individual can learn both the inventory and the instruction does not mean that language loses its status as a cultural phenomenon.

[5] By Plato's problem I understand the fact that "we know so much on the basis of so little evidence" (see Chomsky 1986).

[6] Again, however, this does not necessarily mean that I am committed to biological reductionism at the level of world 2. My non-ontologically defined world 2 can be an artefact consisting of two distinct domains that cannot be reduced to one.

[7] I agree with Chomsky (1980) that human language results from the combination of certain computational faculties with certain conceptual faculties. The crucial, but unproven and implausible, assumption of the standard interpretation is that the combination of faculties leading to language is a matter of biological necessity. I find it much more plausible that the combination in question is not genetically determined, but the result of an accidental human invention. The computational and conceptual elements of language are connected by lexical items after all, which are clearly invented by humans (even if they are highly biologically pre-structured). Compare the combination of two mental faculties to folding one's hands. In some loose sense, the capacity to fold one's hands falls within the genetically determined possibilities of the human body. It would be absurd, however, to say that the actual folding of someone's hands is genetically determined. The fact that in our culture some people fold their hands for spiritual purposes is in no sense innate or biologically determined. Similarly, there is no reason to assume that the connections between the modules of language can be explained in genetic terms. It seems more likely that the instruction to combine the mental faculties in question is not in our genes but in our culture (not in the form of explicit instructions but in the form of examples).

[8] In abstraction from application to particular languages, X-bar categories show full mirror-image symmetry with respect to the projection line. Iteration can be found in the formation of verb clusters in many languages or in the formation of dynasties (see Koster 1987a). Properties like symmetry are typically of the kind that we also find in non-living matter. It seems difficult to believe that such properties exist for the purpose of human culture (see Koster 1987b and 1988 for discussion).

[9] It seems to me that an important role of world 3 is to encode (mostly implicit) instructions to combine elements of world 2 to something new (see note 7). In such cases, there is usually no transparent relation between the world 2 elements and their combination in world 3. Thus, language is a world 3 combination (based on some cultural instructions) of the biologically determined computational and conceptual faculties of world 2. Taken apart (in world 2), neither of the two faculties can be seen as proto-language.

If we should make a distinction between world 2 and 3, as I believe we should make, the assumptions of classical rationalism are seriously undermined. To the exten that classical rationalism makes a distinction between world 2 and some world 3, it usually implicitly commits itself to the view that the concepts of our knowledge are transparent with respect to innate structure. My modified rationalism radically denies this transparency, while remaining opposed to empiricism in so far as it assumes rich innate structure. If there is no world 2 - world 3 transparency, it is possible that all world 3 concepts and propositions are without world 2 counterparts. This annihilates the notion of innate knowledge. I assume, in other words, that the notion "knowledge" only makes sense at the level of world 3, without giving up the rationalistic idea that much of world 3 is almost completely biologically pre-structured.

[10] See Chomsky, Huybregts, and Van Riemsdijk (1982, ch. 1).

[11] Frits Staal does not necessarily disagree with my interpretation (personal communication).

[12] In spite of its public status, I assume that all aspects of the lexicon are themselves pre-structured in world 2. Thus, there are heavy constraints on the possible sound shape of words and on the the conceptual content with which they are connected. The association of these heterogeneous elements is arbitrary and a matter of convention, as was stressed by Saussure.

[13] These levels of representation can only be distinguished if "move alpha" (in the sense of Chomsky 1981) exists. "Move alpha", however, can only be distinguished from other local grammatical relations by inspecting the lexical content of the material involved. In fact, there is no empirical reason to believe that "move alpha" exists (Koster 1987a).

[14] For a discussion of 19th century psychologism in logic, see Baker and Hacker (1984, ch. 2). Frege is usually credited for having given the death blow to this psychologism. It is, however, far from clear to what extent Frege's alleged Platonism is anti-psychologistic in the relevant sense. Frege's position is perhaps better situated within the secularized Platonism of Lotze and others (see note 3 above and also Sluga 1980). This version of Platonism is not always Platonistic in the full sense and even sometimes approached in psychologistic terms (under a somewhat broader construal of the term) (see Laudy 1988).

[15] For a subjective idealist like Brouwer (ultimately a solipsist and a mystic), "to exist is to exist in the spirit" (Heyerman 1981, 26). It seems out of the question that Brouwer wanted to assimilate the study of the "spirit" to the natural sciences in Chomsky's sense. In fact, Brouwer even considered the sciences a form of cultural decadence (Heyerman 1981, 18).

In spite of a very different (positive) attitude towards the natural sciences, which I share with Chomsky, I believe that my view of language (and mathematics) is closer to Brouwer's view of mathematics than to Platonism. Like Brouwer, I believe that mathematical objects are creations of the human mind. Similarly, I believe that linguistic phenomena are created by the human mind. Unlike Brouwer (with respect to mathematics) and Chomsky (with respect to language), I believe that the phenomena in question are non-individual and primarily exist in the supra-individual world 3. In this way, both language and mathematics still derive their respective properties, among other things, from the fact that they are grounded in the physical/mental world 2.

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