

Note to the Author:
Please provide the Affiliation

Don't forget the determiners, Jan

Henk J. Verkuyl
@@ affiliation

To recognize something as a real thing or event means to succeed in incorporating it into the system of things at a particular space-time position so that it fits together with the other things recognized as real, according to the rules of the [linguistic] framework.

(Carnap 1950: 205)

In 2004, Jan Koster sent me a letter in which he stated his convictions on semantics in the form of ten theses, expecting some feedback from a semanticist. Unfortunately, for reasons that are not particularly relevant here, the year 2004 distracted me from being able to think about linguistics: the letter stayed in my 'to answer'-box, not managing to get out of there. The present collection of squibs, however, seems to be an opportunity to make up for my negligence. Here are the first three theses (translation mine):

- A. "Meanings (let alone denotations) are not properties of words but of interpretations/intentions of living speakers and hearers (meaning cannot be found in computers, zombies, those unborn and just having died)."
- B. "Concepts are not meanings of words but terms in our theories about reality (varying from 'naive' theories to scientific theories). We use words to manage these concepts, but that is just one out of many possibilities for the use of words."
- C. "Therefore, it is unjustified to hang the discussion about universals (essentials) on words as has been done since Plato and Aristotle. The same complaint applies to Wittgenstein's idea of family resemblances or to Rosch's prototypes."

The possible objection that I base myself on unpublished material never intended as being put forward in the public domain, can be countered by pointing out that A – C are consistent with papers such as Koster (2005a) and (2005b) and in particular with Koster (2009), which is not only highly interesting but also provides the points of attachment for the blame that I deserve for not having reacted in time. Admittedly, this sounds a little haughty because it may seem to imply that in his future work Koster will include an area which in the present contribution will be argued to have been largely neglected so far. Let me modestly add that I hope so.

Thesis A denies that a word has a meaning. What a word does is not really clear. On Koster's current website we read under the label of Lexical Semantics that words

are “associated with complexes of coded and incomplete information that are partially represented in individual brains but ultimately belong to a shared culture”. This is not so clear either because the notion of *associated with* calls for clarification.

Thesis B says that concepts are not meanings but rather terms in our theories about reality. This puzzles me because a theory is a well-organized (thing) language as Carnap (1955) pointed out. It would then follow that terms do the same as words, the difference being that for them the role in the language game is stricter than for ‘normal words’. Perhaps I should see this as too enthusiastic a slip of the pen but what Koster seems to do in the theses A and B is to sweep the notion of meaning under the carpet of the term ‘is associated with’ of his internet text and leave us with some uncertainty about what concepts do. Let me therefore have a closer look at that with the help of Koster (2009: 74, 75):

“[...] what is stored in association with [commons nouns and proper names] in our brain is not meanings or concepts but something that only becomes meaningful from outside, i.e. by the agency of a human interpreter operating in a given context. *Concepts (and extensions) are not properties of words but properties of interpretations of words* [italics Koster]. [...] What can be stored in the brain in association with words must be physical, i.e. something representable by neural circuitry or other material properties making up the memory banks of the brain. In short, words must be associated with coded information in the brain, not with meaning, because all known physical structures are without inherent meaning.”

“In the case of the information stored for words, we do not know how much information is stored for the word itself and how much information is added by the interpretive mechanisms. But the high plausibility of the division of labor in question further undermines the idea that meanings or concepts are directly found in the brain as stored properties of words. Concepts only exist as the results of agentive function assignment, as created elements involving three factors: the information stored for the word itself, the contributions made by our (possibly innate) capacities of processing and interpretation, and, last but not least, the context of use.”

In the first quote, we find a clear description of what Koster wants, but it sheds no light on the notion ‘associated with’. In the second quote, Koster seems to think in terms of a function. Excluding a functional application of the form $f(w) = c$, where f maps a word w onto a concept c , Koster seems to opt for something like $f(w,p,u) = c$, where f is a three-place function operating on a word, on processing p and on a context of use u . This would make it impossible to see words as an internal matter. Koster (2005b: 351) indeed argues that language is too contaminated by culture for it to be able to function as I-language in Chomsky’s sense, because human knowledge is never individual but always inextricably bound up with public conventions and rules:

[... while discussing the relation between biology and culture, Koster compares language use and playing the piano...] “We can only speak of language because

of the invention of cultural artefacts, *words*, which are comparable to the piano. Only thanks to the interfacing properties of our cultural invention we can speak of language. Words connect our abstract computational facilities with our concepts, neither of which have anything to do with language in abstraction from our invented interface elements.”

Koster (2009) contains a fierce attack on the key role for the Merge-operation in minimalism because it is a form of lexicon-independent sentence generation. For Koster it is essential that “sentences are generated by lexicalizing the templates associated with words” (p. 83).

It is really unfortunate that generative syntacticians do not like to admit that more than two decennia before Merge was invented, Montague had already developed a categorial syntax mapping under homomorphism into a semantic algebra, doing exactly what Koster requires. It is not Merge itself but rather its inventors that do not want a semantic algebra alongside a syntactic one. Yet, it is available in the literature and the only thing to do is to not to reject the formal semantic machinery made in the Fregean tradition *a priori* but to see it as workable in a mentalistic perspective.

Following common practice in philosophical analyses, Koster focusses on nominal elements such as nouns and pronouns. Koster (2009) restricts itself to words like *book* and *Schubert*. In formal semantics, the extension of *book* is often said to correspond with a set. In maintaining that a noun like *book* applies to a set, one needs to be more precise in two ways. Firstly, one should say something like: *book* is interpreted in a certain domain of interpretation which belongs to a set of possible words in each of which the noun *book* may be interpreted. Secondly, one should add that the set of books in a specific domain of interpretation is not the meaning of *book*, but that whatever we like to call meaning would be a function enabling us to use the noun *book* properly in every possible domain of interpretation. To obtain an extension, we use a characteristic function to bring everything that may be called a book to 1 and what can not be called a book to 0. This mathematical function even applies for Wittgenstein because all things that are called *Spiel* are mapped to 1, the rest is not. Note that this function does not really require a common property shared by books, but in spite of Wittgenstein's thesis there is one such property: ‘to be called *book*’ (or: ‘what counts for me as a book’). That suffices, at the level of an individual speaker. The need for a check on a common property among the members of a set is an external societal affair which has nothing to do with the use of a characteristic function.

Speaking of functions as possibly having a mental correlate, I hit upon another question raised by Koster: is it an empirical issue to determine whether mathematical functions have neurological correlates or not? Recent research by Roland Friedrich and Angela D. Friederici (2009) reveals that it is possible to use fMRI-scans to determine whether the syntax of sentences (involving functions) yields well-formed corrections or not. They write:

“Finally, the present neuroimaging data suggests that a formal ruled-based generation and decision process as in the form of a calculus is effective because it strives for an optimal balance between data compression and reliability, implemented at the neural level. This in turn permits humans to communicate complexly structured information and to phrase problems more easily in face of the limits of the human processing system.”

This is not to say that we have now found all sorts of means to detect the use of functions as interpretations of formal syntax, but it indicates that one may relate (the processing of) sentential structure to processes made visible by the fMRI-technique, which is still in its initial phase. It is too early to expel functions in our logical representations from the domain of things that can be made visible in one form or another. After all, functions are quite reliable tools for computing. In that sense, linguistics should continue its empirical study and remain the supplier of ideas about linguistic structure as operative in language use.

The characteristic function that I hinted at falls within the domain of investigation in Koster’s work because of his restriction to nouns. But now I enter an area unfortunately neglected by him: all the work done on generalized quantification in the past decennia. In fact, with a sort of disdain which characterizes so many main stream generativists but which is not really Jan Koster’s way of doing, he puts away Fregean formal semantics as a sort of externalism so that any discussion is declared irrelevant. See Koster (2009: 65, 79).

“In no way am I committed to [...] any other form of semantics that seeks to develop mental content in (partial) referential terms.”

“The most important characteristic of words of real human languages is that their potential syntactic environments are among their properties in abstraction from any rules or other word-independent computational devices. Thus, somebody who knows English knows that the word *book* can be preceded by an article: *the book*. This is public knowledge: one can find it in reference grammars and if English were part of a culture with an oral tradition only, every native speaker could confirm it.”

I could not believe my eyes reading the last quote because it totally misses the point of what determiners do in a sentence. They are to be interpreted as computational functions not having the double face of set and characteristic function: in the Montagovian tradition the definition of a determiner does not apply to a simple set. In a sentence like *A book fell from one of the tables over there (and I don’t know where to put it)* the determiner *a* can be seen as a function that intersects a set denoted by the Noun *book* with a set of things that are in the set of things that fell from one of the tables over there. In a regular language interaction this sentence invokes a proper answer when the intersection turns out to be non-empty. Semantically, the role of a determiner is

extremely important: it creates an intersection between two sets with the help of which a human being is able to determine whether what is said has been the case or not. It also makes it possible to reduce the polysemous force of a noun by its confrontation with the intersecting predicate: in *The book only exists in her head* it is easy to rule out the interpretation of *the book* as a physical object.

I am aware of the fact that some may consider the term *truth value* as old hat, but dynamic notions like update of a knowledge base, etc. do not diminish the sort of preciseness that is necessary here to understand the impact of using functions in dealing with information. The Fregean distinction between extension (in a specific domain of interpretation) and intension (sense, covering a set of possible worlds) provides exactly what Koster hides under the informal use of 'is associated with'. This is not to say that this is the final verdict, but at least intensional logic has contributed quite fruitfully to linguistic insights.

Not only Dutch and English do have determiners but all languages containing quantifiers have them. That English has articles and Russian does not have them is not of any importance here: both languages have determiners, that is, they have instructions for making structure to which meaning can be assigned if one considers all possible situations in which certain nouns can be used. All users of natural language dispose of a computational mechanism in order to intersect and to derive important information from doing so.

Although as a layman I do not like to express myself about what happens in the brain of animals one may, on the basis of what is known so far, reasonably assume that an ape seeing an approaching tiger computes on the basis of two different pieces of information: 'a predator' and 'approaching'. To my knowledge, biologists assume some mental mechanism for combining these two different pieces of information into an instruction based on the information: 'it is the case that a predator approaches (and you'd better move)'. Do apes have determiners? Certainly not, but they have a machinery to connect pieces of information. Do they have a notion of truth? Well, they have a sense of what is the case. It seems to me that if that part of biology that investigates this mechanism in the brains of animals is part of natural science, one cannot simply consider the study of the same sort of mechanism in humans as something cultural or constrained by epistemological principles. Why should the study of information processing in the brain of primates fall under natural science and be denied to in the case of the human brain. Are we punished for having language? Are we being punished for being able to talk about what is the case?

There is another point to be made in this connection analyzed in Verkuyl et al. (1974) and centering around Leibniz' notion of favourite world, a notion unjustifiedly ridiculed by Voltaire if only taken as a technical term necessary to anchor the set of possible worlds. It is important to note that all changes that may happen when 'traveling through' a set of possible worlds involve nouns, adjectives and one-place verbs and

not so much determiners, prepositions, conjunctives, and two- or more place verbs. In stories about rocks that may speak and open themselves, the preposition *between* does not change into a one-place predicate on the penalty of getting stuck. Computationally, this is an interesting empirical fact because why should we keep things stable in our excursions to different worlds? An answer to that question is in terms of a constraint that cannot be attributed to an external cultural factor, it seems to me. It involves our mental capacity to relate things and these relations are not culturally determined, so it seems. Our orientation in space and time is a matter of biology rather than of culture, although cultural information may ‘color’ them. But lions in a zoo remain lions.

Finally a remark with regard to thesis C on the necessity operator in Carnap’s meaning postulates. They were invented in a period in which mental grammar was outside the scope of analysis. From the point of view of set theory quantifiers of natural language as applied by individual speakers can be given the same analysis as quantifiers in a formal language used externally in the public domain. The difference is not so much a difference in nature of their operation but rather the preciseness conditions with respect to the necessity operator involved. A simple example. I can say and often say *I always take the tram to get to the Central Station* even though I sometimes happen to get to the CS by walking. The large majority of speakers does not bother too much about the conditions making this sentence true. Only judges and niggling people will not allow universal quantification in this case and they will correct me. But this does not mean that the sentence does not express universal quantification. It does, and in spite of that the sentence is normally accepted as being true. In other words, the problem raised by thesis C has not so much to do with semantics itself. Rather it concerns the socially apt property of natural language users to steer between sloppyness and finality. And perhaps the one property that binds the set corresponding to a noun *A* together is simply the metalinguistic property ‘what counts for me as *A* (in the relevant domain of interpretation)’.

References

- Carnap, Rudolf. 1950⁴. Empiricism, semantics and ontology. In *Meaning and necessity: A study in semantics and modal logic*, 205–221. Chicago IL: The University of Chicago Press.
- Friedrich, Roland & Friederici, Angela D. 2009. Mathematical logic in the human brain: Syntax. *PLoS ONE* 4(5): e599.
- Koster, Jan. 2005a. Hebben dieren concepten? *Tabu* 34: 187–208.
- Koster, Jan. 2005b. Is linguistics a natural science? In Hans Broekhuis, Norbert Corver, Riny Huybregts, Ursula Kleinhenz & Jan Koster (eds.), *Organizing grammar: Linguistic studies in honor of Henk van Riemsdijk*, 350–358. Berlin: Mouton de Gruyter.
- Koster, Jan. 2009. Ceaseless, unpredictable creativity: Language as technology. *Biolinguistics* 3: 61–92.
- Verkuyl, Henk, Booij, Geert, Elffers-van Ketel, Els, Klooster, Wim, Luijck, Jan & Schermer, Ina. 1974. *Transformationele taalkunde*. Utrecht: Spectrum.