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CHATEAUBRIAND ON THE PRODUCTIVITY OF LANGUAGE

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Abstract: In this paper, Chateaubriand's account of the productivity of language is put to an historical perspective. Its philosophical significance is assessed. It is shown how it could be expanded to accommodate recent findings of professional linguists.

Keywords: Compositionality. Context. Cooperation. Functional application. Goal. Recursive rules.

CHATEAUBRIAND SOBRE A PRODUTIVIDADE DA LINGUAGEM

Resumo: O presente artigo analisa o tratamento da produtividade da linguagem oferecido por Chateaubriand de uma perspectiva histórica. Seu significado filosófico é avaliado. Também se mostra que este tratamento poderia ser expandido de forma a incluir descobertas recentes de lingüistas profissionais.

Palavas chave: Composicionalidade. Contexto. Cooperação. Aplicação funcional. Objetivo. Regras recursivas.

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As a former commentator of Quine I share the philosophical preoccupations which inspire the two volumes published by Prof. Oswaldo Chateaubriand in 2001 and 2005 under the title of *Logical Forms*. I learned a lot from reading them and agreed with many philosophical positions defended by their author. However my subsequent adhesion to the Montagovian paradigm in linguistics (Thayse et al. 1989) led me to join the community of formal philosophers who try to work out theories which fit all the linguistic data discovered by the linguists.

1. THE CONCEPT OF PRODUCTIVITY

On Chapter 14 of *Logical Forms*, vol. II, prof. O. Chateaubriand stresses an important feature of human language, namely its *productivity*:

Everybody recognizes that productivity is a fundamental speaker of language that reflects its really innovative character. Any competent feature can produce new sentences that he has never heard before. (Chateaubriand 2005, p. 80)

In *contemporary logic and philosophy*, the recognition of productivity goes back at least to Frege's letter to Jourdain (1912):

The possibility for us to understand sentences that we had never heard before is clearly based on [the fact] that we construct [*aufbauen*] the sense of a sentence from parts that correspond to the words. (Frege 1912, 1976 quoted by Rosado-Haddock 2006, p. 73)

The same idea can also be found, ten years later, in Wittgenstein's *Tractatus*:

It belongs to the essence of a proposition that it should be able to communicate a *new* sense to us. (Wittgenstein 1922, 4.027)

and

A proposition must use old expressions to communicate a new sense. (Wittgenstein 1922, 4.03)

Under what conditions can *old* words, combined according to *old* syntactic constructions, generate new senses? My reply will appeal to two features of language: (1) the language is a *potentially infinite set* of sentences, (2) the meaning of the whole depends on the meaning of the parts and their syntactic combination (principle of compositionality).

2. LANGUAGE AS AN INFINITE SET OF SENTENCES

The first feature has been widely recognized for a long time. It can already be found in Descartes' writings, in the *Grammaire of Port-Royal* and more recently in the work of Wilhelm von Humboldt:

Die Sprach muss [...] von endlichen Mitteln einene unendlichen Gebrauch machen. (von Humboldt 1836, quoted by Ruwet 1967, 52)

Let us consider the adverb “very” which applies to adverbs of verb such as “quickly”, “lately” to form new adverbs “very quickly”, “very lately”. We want to account for the fact that the indefinite iteration of this construction preserves grammaticality. Not only “very quickly” is grammatical, but also “very very quickly”, “very very very quickly” and so on. To capture the iterability of the construction “very + adverb of verb” grammarians resort to *recursive rules*.

Prof. Chateaubriand shares Wittgenstein's misgivings about rules that are designed to determine an infinite sequence of values:

As Wittgenstein has forcefully argued, community use cannot completely determine an infinite sequence of values in the required absolute way. (Chateaubriand 2005, p. 91)

To the question “...why is it inexorably insisted that we shall all say ‘two’ after ‘one’, three after ‘two’ and so on?”, Wittgenstein replies by invoking *use*:

“It can’t be said of the series of natural numbers – any more than of the series of our language – that it is true” he says, “but that it is...used.” (Wittgenstein 1937-8, 1956 37-38)

My reply to both Wittgenstein and Chateaubriand is trite. I think extreme constructivism to be untenable. Although I agree with Wittgenstein that the *sequence* generated by enumerating the immediate successor of “0” cannot be said to be *true* [it would be nonsense], I deny that it can be deployed in different ways incompatible with one another. These divergent sequences ($\langle 1,2,3... \rangle$, $\langle 1,2,3...,7,9,11...17,21,25... \rangle$ occur only if we blur the distinction between the word “use” understood as denoting a social practice and the word “use” understood as denoting an action abiding by a norm.

In the same spirit I deny Wittgenstein’s claim that “The proposition ‘it is true that this follows from that’ means simply ‘this follows from that’”. If we adopt Tarski’s semantic notion of *logical consequence* we must reject Wittgenstein’s *deflationist claim*. The semantic statement “It is *true* that B follows from A” does not boil down to the syntactic statement “B *follows* from A”. It should instead be equated with another semantic statement, namely with the statement “B is a logical consequence of A”.

3. A RIGOROUS FORMULATION OF THE PRINCIPLE OF COMPOSITIONALITY

Both Frege and Prof. Chateaubriand avail themselves of the word “construction” to describe the semantic operation which produces a new sense out of old expressions and syntactic arrangement. This is unquestionably a good metaphor but it is nothing but a *metaphor*.

In his *Introduction to Theoretical Linguistics* published in 1968, John Lyons slightly varies the metaphor. The meaning of a sentence or that of a phrase is determined, he said, by *amalgamating* all the semantic components of the lexical items. However he acknowledges that we are, for the time being, incapable of interpreting the word “product” or “compositional function” which occurs in the definition of the meaning of a sentence as “the product of the senses of its lexical constituents (Lyons 1968, p. 476).

Two years later however the challenge was met by Montague, a pupil of Tarski, whose papers *English as a Formal language*, *Universal Grammar* and *The Proper Treatment of Quantification in English* showed how a rigorous syntax and a rigorous semantics could be worked out for a significant (and expandable) fragment of natural language along the lines of Tarski’s semantics of formal languages. Within the framework of Montague it is possible to give a *technical meaning* to the idea of “product” or “composition” which Lyons was aspiring to.

Montague spelled out a recursive semantics which explains how the meaning of the whole is obtained from the meanings of the parts. The key notion is that of *functional application* in the mathematical sense of the term. Let me give an example. For the sake of simplicity, I shall restrict myself to meaning understood as extension and shall ignore intension (sense).

Intransitive verbs such as *walks* are interpreted as sets, or more precisely, as characteristic functions of sets, i.e. as functions e/t

which map individual entities e onto truth-values t . Adverbs of verbs such as *quickly* are interpreted as functions $(e/t)/(e/t)$ which map characteristic functions of sets onto characteristic functions of sets. We obtain the meaning of the phrase *quickly walks* by applying the function which interprets *quickly* to the function which interprets *walks* taken as a value. It ensues that *quickly walks* should be interpreted as the characteristics function of set, i.e. as e/t , and this is as it should be. Clearly *quickly walks* denotes a set, the set of entities which walk quickly.

Montague makes two bold claims:

- (1) I reject the contention that an important theoretical difference exists between formal and natural languages.
- (2)[...] I regard the construction of a theory of truth [...] as the basic goal of serious syntax and semantics. (Montague 1970, 1974, p. 188)

Professor Chateaubriand however rejects such assumptions. Considering the assumption that there is a notion of truth for English sentences generally, he writes:

This is quite false, because the notion of truth to which people appeal is Tarski's, and it cannot be dissociated from a formal analysis of the structure of the sentences. (Chateaubriand 2005, p. 241)

Professor Chateaubriand's misgivings about a formal analysis of the structure of natural language sentences are due, I think, to his dissatisfaction with Quine's policy of regimentation. Chateaubriand blames those who are streamlining natural language by "substituting for English a copy of the formal language involving a bit of English in the form of so-called English predicates". This is precisely what Quine does in *Word and Object*. Yet Quine is immune to criticism since his canonical notation is designed to serve *ontological*, as opposed to *linguistic*, purposes as shown in this passage:

The quest of a simplest, clearest overall pattern of canonical notation is not to be distinguished from the quest of ultimate categories, a limning of the most general traits of reality. (Quine 1960, p. 161)

Professor Chateaubriand's dissatisfaction with the regimentation of natural language in linguistics is fully justified. Montague however refrains from *regimenting* natural language to fit the standard of logic. He does the opposite. He worked out a complex logical formalism expressive enough to capture the idiosyncrasies of natural language.

4. THE CONTEXT PRINCIPLE

In *The Foundations of Arithmetics* published in 1884, Frege had put forward the following principle:

Only in a proposition have the words really a meaning... (Frege 1884, p. 71)

This principle seems to clash with the principle of compositionality which is implicit in *Sinn und Bedeutung* (Frege 1892) and explicit in the letter to Jourdain mentioned in Section I.

Prof. Rosado-Haddock agrees that there is a clash between the Context Principle and the principle of compositionality. He stresses that according to the latter,

[b]oth in the case of senses and in the case of referents the determination is from the parts to the whole, not from the whole to the parts. Thus, we have to first know the sense of the constituent parts of a statement before we know the sense of the whole statement. Similarly, we have to first know the referent of the constituent parts of the statement before we know the referent of the whole statement. (Rosado-Haddock 2006, p. 73)

Yet it seems that there is a grain of truth in the context principle. We should search for an interpretation of the two conflicting principles which would make it possible to adopt both of them without inconsistency. Prof. Chateaubriand took a step in that direction. He provides us with a way of reconciling them by drawing a distinction between meaning dependence and meaning recognition:

[...] the contextual meaning of the word does not *depend* on the meaning of the sentence, but is only *recognized* through the sentence and the context. (Chateaubriand 2005, p. 32]

Elsewhere, Prof. Chateaubriand claims that there is a dependence in the two directions: the meaning of the words determines the meaning of the sentence and conversely the meaning of the sentence determines the meaning of the words. Let us call this thesis the “bi-direction thesis”.

I think there are no units of meaning. There is an impredicative loop, with the meaning of words depending on the meaning of sentences and the meaning of sentences depending on the meanings of words. And all of it depends on basic logico-semantic forms that in turn, depend for their systematic development and explicitation on the development of the language. (Chateaubriand 2005, p. 52)

This second way of reconciling the context principle with the compositionality principle is bolder and requires two amendments: (1) several notions of context ought to be distinguished, (2) it should be recognized that the dependence of the sentence’s meaning upon the words’ meaning differs from the dependence of the words’ meaning upon the sentence’s meaning.

5. WHAT ARE THE UNITS OF MEANING?

I fully agree with Prof. Chateaubriand that there is a whole *network* of dependence relations between words, sentences and even larger entities such as discourse and, at the bottom, language as a whole. Yet I do think that we can drop the very notion of *unit of meaning* without incurring a serious loss.

Let us consider Frege's context principle again, which I repeat here for convenience: "only in a proposition have the words really a meaning". What is wrong with it is the narrowness of Frege's notion of context. If we substitute "language" for "proposition" we obtain a context principle which is accepted by the professional linguists as the following passage shows:

The denotation of "mat" is limited by its contrast in sense with "rug" and "carpet"; the denotation of "paillason" in French is limited by its contrast in sense with "tapis" and other lexemes. We could not reasonably say that "mat" has two meanings because it is translatable into French by means of two non-synonymous lexemes, "tapis" and "paillason"; or that "tapis" has three meanings because it can be translated into English with three non-synonymous lexemes, "rug", "carpet", and "mat". The meanings of words (their sense and denotation) are internal to the language to which they belong. (Lyons 1977, p. 238)

Prof. Chateaubriand focuses on two units of meaning: words and sentences. We have just seen that a much broader unit should be recognized: the semantic structure of language as a whole.

Since 1981, however an intermediate unit has been shown to be of crucial importance, namely *discourse*, i.e. coherent sequences of sentences, as opposed to isolated sentences.

Consider the following sequence of sentences:

I collect memorabilia of Elvis Presley. A man I met on a train sold me his hat. (Hodges 2006, p. 324)

The verb phrase “his hat” can be paraphrased as “the hat of *him*”. What is the antecedent of the pronoun “him”? Is it the indefinite description “A man I met on a train” or is it the proper name “Elvis Presley”? Grammatically speaking both replies are acceptable. If however we strive toward coherence, the first reading is unacceptable. Taking “him” as referring to the man met in the train turns the second sentence into an isolated piece of information which is unrelated to what is said in the first sentence. The second reading, on the contrary, turns the two sentences into a coherent discourse. The hidden pronoun “him” of the second sentence has an antecedent in the first one, namely the proper name “Elvis Presley”.

A problem arises however when we try to find the *logical form* of the discourse which is generated by the second reading. Pronouns like “him” are represented by bound variables. However neither standard predicate calculus nor Montague’s logic allow variables occurring in a sentence to be bound by a quantifier occurring in another sentence as it is the case here if we translate the sentences into first-order logic.

The first author to succeed in handling this problem is a pupil of Montague, Hans Kamp, who developed a theory called *discourse representation theory* (Kamp 1981, 1984). Instead of translating natural language into a semi-formal language which borrows its referential apparatus to first-order logic, Kamp introduced an intermediate layer between language and the world, i.e. *discourse representations*. He operates with reference markers which fulfil the role of a quantification mechanism. Their binding force however is more powerful than that of the quantifiers of first-order logic. A marker located in a sentence can bind variables which occur in another sentence. Hence it becomes possible to capture coreference across sentences (Gamut 1991, pp. 264-297).

6. A DEFENCE OF THE BI-DIRECTION THESIS

Consider the following sequence of sentences (Kameyama 1996, p. 122):

(1) John hit Bill. *He* was seriously injured

Whom does the pronoun *He* in the first sentence refer to? Kameyama replies in these terms:

[t]he combinatoric rule of pronoun interpretation would say that both John and Bill are possible referents of *he*, while the preferential rule would say that Bill is preferred here because it is more plausible that the one who is hit gets injured than vice-versa. (Kanazawa 1996, p. 113)

In the above example the reference of the pronoun does not contribute to the reference of the whole sentence. It rather receives its reference from the context constituted by background common-sense knowledge.

Should we conclude these two sentences exemplify *mutual dependence*? Not quite. As Kameyama observes, we need two systems: *indefeasible semantics* which predicts the possible dynamic interpretations of utterances and *defeasible pragmatics* which prioritizes these possibilities.

Linguistic investigation confirms Chateaubriand's claim that the dependence between the meaning of sentences and the meaning of the words which occur in those sentences goes in two directions: *inside out* and *outside in*. The two dependences however differ in kind: the former is semantic, the latter is pragmatic.

Not all contextual dependences are pragmatic. There are also syntactical combinations which modify the meaning of the lexical components involved. Examples of this type of semantic dependence

can be found in an area of linguistics known as the theory of *Aktionsarten*.

Linguists and philosophers agree that four lexical-aspectual classes of verbs should be distinguished: (1) activity verbs (*run*), (2) state verbs (*resemble*), (3) accomplishment verbs (to *cross* [*the street, the river, ...*]), (4) achievement verbs (*win*) (Vendler 1967).

M. van Lambalgen and F. Hamm have observed that the *sentential context* (what Bar-Hillel called “co-text”) can produce a category shift. A verb such as *build* which, in isolation, denotes an action is transformed into a phrase denoting an accomplishment by adding a direct object such as *a house* [*build a house*]. Conversely a phrase which denotes an accomplishment such as *drink a glass of wine* can be transformed into a phrase denoting an activity by subtracting the words *a glass of* [*drink wine*]. If a state verb such as *resemble* is put in an appropriate sentential context, it is transformed into a phrase denoting a change in the degree of resemblance. The following sentence illustrates that shift: “She is resembling her mother more and more every day”. (Lambalgen & Hamm 2005, pp. 169-177)

8. PRODUCTIVITY AND COMPOSITIONALITY

D. Davidson called upon the compositionality principle as a way of accounting for the learnability of language:

When we can regard the meaning of each sentence as a function of a finite number of features of the sentence, we have an insight not only into what there is to be learned; we also understand how an infinite aptitude can be encompassed by finite accomplishments. (Davidson 1964, 1984, p. 8)

Prof. Chateaubriand called upon the same principle as a way of accounting for the productivity of language:

The very productivity of language would make no sense if the meaning of sentences were not built from the meaning of the parts. (Chateaubriand 2005, p. 32)

J. Hintikka stresses yet another role of the compositionality principle:

The real impact of the principle of compositionality nevertheless has not been emphasized in recent discussion. It is illustrated by the role of the principle in facilitating recursive definitions of semantical attributes. Such recursive definitions proceed from simpler expressions to more complicated ones. They are not possible unless the attribute to be defined is semantically speaking *context-independent*. (Hintikka 1996, p. 107)

Hintikka's remark reveals that the compositionality principle is incompatible with the recognition of the context dependence in a deeper way than was suggested above. In the former Section, we saw how Prof. Chateaubriand succeeded in reconciling the *compositionality principle* with the *context principle* by appealing to two dependence relations which work in opposite directions. Here the situation is worse. We need a framework which accommodates both a *context-free* semantical component and a *context-dependent* semantical component. This formidable challenge was met in three formalisms: (1) Kamp's *discourse representation theory* which we have mentioned above, (2) Hintikka's *game theory* and (3) Groenendijk's and Stokhof's *dynamic predicate calculus*. (See Sandu 1997).

9. OTHER FORMS OF PRODUCTIVITY

I fully agree with Professor Chateaubriand's claim that the productivity of language rests upon the possibility of constructing new sentences with old words and old grammatical constructions. But it would be unduly restrictive to reduce the productivity of language to that possibility alone.

This point was made forcefully by Nadine Lavand in her presentation of Hintikka's game-theoretical semantics:

La sémantique des jeux qu'il a conçue permet à Hintikka, qui fait du langage une *activité orientée vers une fin*, de concevoir sa créativité comme autrement plus puissante et plus subtile qu'un simple effet combinatoire. (Lavand 1994, p. vii)

Whatever opinion one may hold about the question whether language is rule-directed, goal-directed or both, it is clear that *conversation* ought to be conceived as a purposeful activity which, as Grice has shown, obeys a Cooperation Principle. Conversation has a rationality of its own. The Gricean maxims which spell it out illuminate a facet of the productivity of language which puts to work properly linguistic competence and general intelligence. Just to give a flavour of these maxims, let me mention the maxim of quantity: "Make your contribution as informative as is required (for the current purposes of the exchange" (Grice 1975, p. 67).

Natural languages are full of little expressions whose meaning remains elusive until we start applying Grice's approach. Consider the word *either* in the sentence below which is uttered in a situation where the weather is not nice and this is known to speaker and hearer:

I will not go for a walk this afternoon. I have an urgent work to finish and *the weather is not nice either*.

In the situational context we have just described, the italicised sentence does not increase the information on the weather. Nevertheless it does not violate the maxim of quantity. As Professor Tovenà observes:

What is peculiar to this type of example is that the new information being contributed is limited to the relevance of the weather conditions for establishing an [...] argumentative goal. (Tovena 2005)

It is clear that the meaning of the utterance is not the mere outcome of the combination of the meanings of the lexical items. The argumentative goal plays a crucial role in the interpretation of the utterance.

Prof. Chateaubriand's account of productivity of language is a valuable contribution to the subject. It has great explanatory power. It should however be expanded to accommodate recent findings in linguistics.

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