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Generativist Semantics

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The major breakthrough of componential analysis occurred outside the structuralist framework, however, when Jerrold J. Katz and Jerry A. Fodor introduced componential analysis into generative grammar. Their paper 'The structure of a semantic theory' of 1963 is a landmark in the history of lexical semantics of because the discussions it engendered from its first formulation in the early 1960s up to the mid- 1970s occupy a pivotal role in the development of lexical semantics. The Katzian model is a combination of a structuralist method of analysis, a formalist system of description, and a mentalist conception of meaning.

The three features of Katzian semantics are:

1. The culmination of structuralist semantics—evidently refers to the preceding history of lexical semantics.
2. The explicit attention for the description of meaning in the context of a formal grammar.
3. The interest in the psychological reality of meaning.

These features raise new questions, and they suggest new adequacy criteria for the description of meaning.

3.1 Katzian Semantics

What follows a brief account of the approach of Katz and Fodor to generative semantics, and then sketch how it gave rise to further developments.

3.1.1 Formal Dictionary Entries

Katz and Fodor's componential analysis gives an example of the way in which the different meanings of one single word, when analysed componentially, can be represented in a formalized dictionary as part of a formal grammar. What the dictionary entry for the English word *bachelor* would look like is demonstrated in the Figure below.
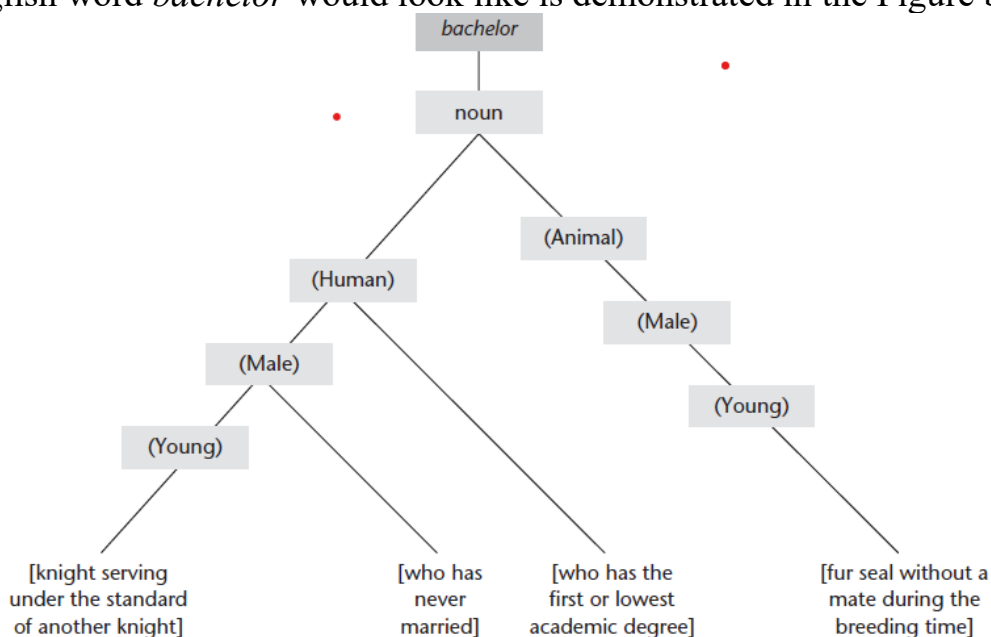
Two types of semantic components can be found in the diagram: markers and distinguishers (indicated with round and square brackets respectively). The first constitute is called the 'systematic' part of the meaning of an item, i.e. those aspects in terms of which selection restriction are formulated. A verb like *speak*, for instance, requires a human subject, and so (Human) features as **a marker**. **Distinguishers,** on the other hand, represent what is idiosyncratic about the meaning of an item. Next to criteria of systematicity and economy, the decision to consider a descriptive feature a marker or a distinguisher is determined by the question whether that feature is needed for the disambiguation of sentences. For instance, in order to explain why language users do not interpret the sentence *the old bachelor finally died* as being ambiguous between a 'shield-bearer, armiger' reading and an 'unmarried' reading of *bachelor*, a distinguisher like [young knight serving under the standard of another knight] would be split up into the marker (Young) and the distinguisher [knight serving under the standard of another knight]. In other words, the absence of ambiguity can be accounted for by supposing that the semantic component 'young' is a marker. An anomaly would in fact arise within the noun phrase *the old bachelor* if the marker (Young) of the noun combines with the marker (Old) that is activated by the adjective. The unequivocal interpretation of *the old bachelor finally died* indicates that this anomalous interpretation is indeed ruled out.

In Katz and Fodor's model, the formal mechanism behind the exclusion of semantic anomalies consists of so-called projection rules. Projection rules are responsible for the combination of the lexical meanings of individual words in a sentence into constituent meanings, and the combination of the latter into a representation of the sentential meaning. In a constituent like *the old bachelor*, the individual semantic representations of *the*, *old*, and *bachelor* are merged into a meaning representation of the noun phrase *the old bachelor*. If *bachelor* is interpreted in the 'shield-bearer, armiger'-sense, the meaning representation of *the old bachelor* features the simultaneous occurrence of (Old) and (Young), and this has to be rejected as anomalous. If *bachelor*, on the other hand, is given the 'unmarried' reading or the 'holder of a certain academic degree' reading, no anomaly emerges. Of course, this only works if the formal grammar 'knows' that (Old) and (Young) are mutually exclusive, but here another aspect of lexical semantics plays a role: 'old' and 'young form an antonymous pair (an 'antonymous n-tuple' in the terminology of Katzian semantics), and this antonymous relationship accounts for the noncombinability.

Note further that projection rules underlie the operation of selection restrictions: when amalgamating subject and verb, the grammar checks whether the overall meaning interpretation, resulting from the projection rules, conforms to the constraints imposed by the selection restrictions.

3.1.2 The Emulation of Structuralist Semantics

Katz compares his methodological perspective in his componential approach to semantics to that of physics in that both disciplines postulate abstract entities that cannot be directly observed in order to explain observable phenomena. In linguistics, these abstract entities are formal dictionary entries and projection rules, which are used to account for observable

characteristics and relations between words and sentences. Those observable characteristics take the form of judgements that language users can pronounce with regard to the semantic properties of sentences. Given their ability to interpret utterances, language users would know, for instance, whether or not a certain interpretation is an anomaly. From this methodological perspective, the empirical basis of semantics is a collection of judgements with regard to semantic properties and relations (Katz 1972: 4): Two essential ways can be recognized in which the Katzian approach moves beyond its structuralist basis:

1- **Formalization**: Katzian model is more formal than structural. Katz does not merely want to determine those relations and properties, but takes them as the input for a further step, i.e. to show how they follow automatically from the underlying featural representations of meaning and the working of the projection rules. The grammar should be able to decide automatically whether or not two words are hyponymous, and for this purpose it will have to contain a formal definition of the concept 'hyponymy'. For instance, if one of the meanings of *bachelor* is represented by (Human)(Male)[Who has never married], and if one of the readings of *man* is represented by (Human)(Male), then we can easily decide that *bachelor* is a hyponym of *man*: the componential definition of *bachelor* includes the componential definition of *man*, and that inclusion constitutes the formal definition of hyponymy. In this sense, the componential representation of meaning becomes a formal basis, not just for describing the meaning of words, but for a strict definition of semantic phenomena like anomaly and hyponymy.

2- **Psychology**: Katz and Fodor introduce a psychological element into natural language semantics. The object of investigation is not primarily identified as 'the structure of the languag', but as an ability of the language user: the explicit aim of linguistic semantics is to describe the ability of the language user to interpret sentences (1963: 176). This obviously ties in with the Chomskyan introduction of the linguistic competence of the language user as the proper object of linguistics. Rather than thinking about language as something that exists as such, as a system that can be studied in its own right and apart from the people who use it, language receives a mentalist interpretation.
In short, Katzian semantics epitomizes structuralist semantics by maximally taking into account the various structuralist phenomena to give lexical semantics a mentalist twist by focusing on the language user's ability to understand and produce meaning.

3.2 Tensions in Generativist Semantics
Many suggestions were made to improve the formal apparatus introduced
by Katz and Fodor. Two important and interrelated developments are presented here: the gradual introduction of representational formats inspired by symbolic logic, and the contrast between a decompositional and an axiomatic semantic representation.

3.2.1 Minimal or Maximal Semantics?

Several suggestions were made to improve the type of componential description that was introduced by Katz and Fodor (1963). The distinction between markers and distinguishers, for instance, was fairly quickly abandoned Also, alternatives were formulated for the way in which individual semantic features were represented. Katz (partially) used a notational system based on a plus/minus notation. For instance, for describing multiple oppositions ('antonymous n-tuples' in Katz's terminology), we may follow the notation suggested by Leech (1974):

1 penetrable: solid
2 penetrable: liquid
3 penetrable: gas

Weinreich (1966) remarked, that the projection rules blur the distinction between *cats chase mice* and *mice chase cats*: the result of the amalgamating process is an unstructured set of features, and this set is identical for both sentences, since they are composed of the same lexical items. Katz (1966,1967) then introduced 'complex markers' of the following type (the item to be described is *chase*):

$$((\text{Activity of X}) (\text{Nature: Physical})) ((\text{Motion})(\text{Rate :(Fast)})(\text{Character :}$$
$$(\text{Following Y}))), (\text{Intention of X : (Trying to catch}((\text{Y})(\text{Motion}))))) .$$

Complex markers of this type were meant to ensure that amalgamated semantic representations would still have structure: in *cats chase mice*, X would be substituted by the representation of *cats*, and Y by the representation of *mice*, and in *mice chase cats ,* the opposite would be the case. However, Bierwisch (1969) states that the formal apparatus of symbolic logic would yield a far more economical solution to the descriptive problem by using the symbolism of predicate logic.The idea could be could be illustered in the following propositions:

- Chase (cat, mice)
- Chace (mice, cat)

The only difference between the two propositions is the order of the arguments.

In its attempt to design a semantically based syntax, Generative Semantics equated the standard categories of predicate logic with specific word classes traditionally known from natural language syntax. Propositions would be equated with sentences (S), predicates, quantifiers and operators with verbs (V), and arguments with nouns (N). In addition, the familiar tree structures of generative syntax, instead of the linear representations of standard logic, would be used to represent semantic structure. A much-discussed example of the descriptive practice of Generative Semantics (as widely discussed, in fact, as Katz and Fodor's *bachelor*) is McCawley's (1968) analysis of the verb *to kill*.

The schism between the proponents of an autonomous syntax with minimal semantics and the defenders of a maximally semantic approach was intense, and influenced the history of modern linguistics to a considerable extent. Although the chasm belongs to the story of theoretical linguistics at large rather than to the story of lexical semantics, it is useful to say

something more about it, because it does have an influence on the development of lexical semantics.

On the one hand, Katz and Fodor's incorporation of semantics into the formal theory of grammar constituted a major shift of perspective for generative linguistics. In the initial phase of its development, in Chomsky's *Syntactic Structures* (1957), no place was reserved for semantics: a grammar describes the formal (phonologic and syntactic) features of a language, but an additional semantic representation is passed over. Katz and Fodor, then, demonstrated that a formalized semantic description could be incorporated into the generative framework. They were successful to the extent that, next to the traditional syntactic and phonologic component, Chomsky explicitly incorporated a semantic component in his *Aspects of the Theory of Syntax* (1965), the so-called Standard Theory of generative grammar.

Putting meaning in primary position in the architecture of a grammar is therefore somewhat counterintuitive from the point of view of the Chomskyan research programme. There is a firm conviction in Chomskyan linguistics that the genetic essence of natural language is syntactic, i.e. that what makes language uniquely human is its syntactic complexity and creativity, not its symbolic quality as such. It is no surprise, then, that the 'semantics first' position of Generative Semantics was rejected by its theoretical counterpart, Interpretive Semantics. While Generative Semantics proposed that the underlying representation of a sentence would be a semantic one, Interpretive Semantics took the position that the basic structure of a sentence is a syntactic one, and that semantics only comes in as an interpretation of those syntactic structures.

Generative Semantics vs Interpretive Semantics
The bitter debate between Generative and Interpretive Semantics was largely settled in favour of the latter: mainstream generative grammar adopted a much more restrictive attitude with regard to the incorporation of semantics in the grammar than was the tendency in Generative Semantics. In the subsequent stages of the development of generative grammar, semantics would typically involve topics like the argument structure of the sentence, the interpretation of quantifiers, and the coreference relations of anaphors and pronouns. Lexical semantics became a minor topic within formal grammar. The fact that the broad semantic interest of Generative Semantics was ousted from generative grammar does not imply, however, that it disappeared completely.

One specific instance of the restrictive stance of generativist semantics concerns the relationship between semantic and encyclopedic knowledge, or more broadly, between linguistic meaning and cognition at large—a relationship that we have encountered a number of times already in our history of lexical semantics. As we saw earlier, Katz and Fodor endeavour to describe 'the ability to interpret sentences' of the language user. They recognize, however, that this is an aim that might be too broadly defined: the act of interpretation involves the full extent of the language user's knowledge, including his

knowledge of the world rather than just his knowledge of the language. At the same time, the focus of linguistics should be on knowledge of the language, not knowledge of the world: an upper limit to the scope of a semantic theory is therefore necessary. Katz and Fodor try to define that limit in the following way: 'Grammars seek to describe the structure of a sentence in isolation from its possible settings in linguistic discourse (written or verbal), or in nonlinguistic contexts (social or physical)' (1963: 173).

Katz and Fodor, following the basic tendency of structuralism, explicitly try to distinguish between semantic and encyclopedic knowledge. They argue that linguists should focus on the meaning of words and sentences as they are used in language, rather than on the broader meaning that they may have in the context of the world. Katz further adds that a componential definition of lexical meaning do not only include lexical relations like synonymy and hyponymy, but also include sentential properties. Anomalies like *red is green*, for instance, are properties of sentences, not of lexical items. One of the important sentential properties is that of analyticity versus syntheticity. A sentence like *uncles are males* is an analytic truth, i.e. a truth that holds on semantic grounds, in contrast to *uncles are generous*, of which the truth or falsity must be determined case by case on factual grounds. With regard to the formal description of analyticity, a sentence is analytical if the meaning of its predicate is a component of the meaning of the noun. The conceptual pair synthetic/analytic links up with logical semantics, where the pair of concepts was borrowed by Carnap from Kant. Carnap states: 'The truth of some statements is logical, necessary, based upon meaning, while that of other statements is empirical, contingent, based upon facts of the world.' (1956: 222). The first class of truths are called analytic, whereas the second is called synthetic. Analytical truths are logical truths like *a sentence is true or it is false* (there is no third possibility), but also sentences like *if John is a bachelor, then he is not married*: such a sentence is necessarily true on the basis of the meaning of *bachelor* and *married* (being a bachelor inevitably implies being unmarried).

The distinction between analyticity and syntheticity is related to the distinction between semantic and encyclopedic data, because analyticity is based on the meaning, and the meaning alone, of the terms involved. Conversely, the truth of synthetic statements is said to depend on facts in the world. So, if we intend to use the notion of analyticity to separate semantic from encyclopedic knowledge, all the features that enter into the definition of an item should have the same status as *not married* in the definition of *bachelor*: all the features should be inextricably and necessarily implied by the item. But if we think of the vagueness in the demarcation of word meaning that was signalled by Erdmann, it seems likely that the semantic features that may be invoked to define a lexical item do not always have this analytic status. If this is indeed the case, the distinction between analyticity and syntheticity is probably not a successful method for distinguishing between a semantic and an encyclopedic level of description.