DISCUSSIONS

INTERPRETATIVE SEMANTICS MEETS FRANKENSTEIN

This paper is a reply to Katz's 'Interpretative semantics vs. generative semantics', which, as my title[1] suggests, is directed not against a theory that anyone subscribes to but against a monster that was put together out of pieces of several corpses. Before taking up Katz's arguments, it would be worthwhile to give a thumbnail sketch of the theory that he claims to be attacking, which the reader may supplement by consulting such works as Lakoff (1970a, b), McCawley (1970a, in press), and Postal (1970). The term 'generative semantics' is applied to a theory of grammar which has evolved out of that of Chomsky 1965, from which it differs in a number of major respects, of which the following had already appeared in the papers by me and Lakoff to which Katz refers and other papers of that vintage. (1) Semantic structures are claimed to be of the same formal nature as syntactic structures, namely labeled trees whose non-terminal node-labels are the same set of labels that appear in surface structure. (2) The notions of a 'deep structure' which separates syntax from semantics and a distinction between 'transformations' and 'semantic interpretation rules' are given up in favor of a single system of rules which relates semantic structure and surface structure via intermediate stages which deserve the name 'syntactic' no more and no less than 'semantic'. (3) It is held that the rules needed to determine what a grammatical sentence may mean are also needed to determine what is grammatical at all. (4) A grammar is taken not to generate a set of surface structures but a set of derivations, and to consist of a set of 'derivational constraints': constraints on what combinations of elements may occur in semantic structure, on what combinations of elements may occur in surface structure, and on how different stages of a derivation may differ from each other. Subsequent papers have argued that it is necessary to allow derivational constraints to mention non-consecutive stages of derivations and have elaborated and clarified the notion of semantic structure and its relation to logic and provided reasons for taking 'semantic structure' to be the level of linguistic structure to which logical rules of inference apply (so that it can appropriately be called 'logical structure'), provided that 'logic' is taken in a sense which is broad with regard to what it covers (i.e. its scope includes not only 'inference' but other relations between the contents of sentences,

[1] My title parodies that of an Abbott and Costello film only because there is no Marx Brothers film whose title lends itself to an appropriate parody.

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not only the study of 'declarative' sentences but of the full range of sentences in natural languages, and not only the logical properties of *and*, *or*, *not*, *if*, *all*, and *some*, to which logicians have been unduly attached, but the logical properties of all elements of content) and narrow with respect to the linguistic constraints on the entities that are recognized (e.g. rather than 'atomic predicates' being allowed to be arbitrary functions, as in the work of most logicians, the existence and atomicity of putative 'atomic predicates' must be linguistically justified). I will use the term *natural logic* (following Lakoff) to refer to 'logic' in this sense.

Katz claims to be defending a theory of transformational grammar which involves a level of 'deep structure' as distinct from 'semantic structure' and a system of 'semantic interpretation rules' as distinct from the inverses of transformations. Curiously, little of his paper is devoted to attempts at justifying either of these dichotomies. Katz characterizes 'deep structure' as "a level of syntactic structure for which the best account is a set of phrase markers K that satisfy the conditions: (5) K is the full input to the transformational component of the grammar... (6) K is the full input to the semantic component of the grammar..." (221). This characterization of 'deep structure' gives no way of telling what the deep structure of anything is unless it is supplemented by a fairly precise characterization of what the 'transformation component' and 'semantic component' of a grammar do. Since all that Katz says about them is that their outputs are surface structures and semantic representations respectively and that the semantic component "must be a function F that is both *compositional* in that F determines the semantic representations of a constituent (including a sentence) from the semantic representations of its subconstituents, and *general*, in that, for any constituent of the language, F recursively determines the semantic representations assigned to it, with respect to the description the constituent receives in the syntactic component" (225), his characterization of 'deep structure' is consistent with both the position that the 'transformational component' is empty (and thus that 'deep structure' is identical to surface structure) and the position that the 'semantic component' is empty (and thus that 'deep structure' is identical to semantic structure), which are two only terminologically different versions of the principal claim that he is arguing against. However, Katz's actual assumptions about 'deep structure' are in fact far richer than the characterization of it which he attributes to himself, and indeed, he assumes all the characteristics of 'deep structure' which he castigates Lakoff (1968) for taking to be defining characteristics and gives 'proofs' of them which purportedly have (5)–(6) as their premises but in fact have their conclusions for their premises. For example, in his 'proof' that (5)–(6) imply that lexical insertion must take place at deep struc-

ture, Katz assumes that all the lexical items of a sentence must be present in the input to the semantic interpretation rules. I am at a loss to see how Katz could claim that (5)–(6) imply that lexical insertion must take place at deep structure, since he has clearly seen Gruber (1965), which operates in terms of a level of deep structure which satisfies (5)–(6) and whose ultimate elements are not lexical items but semantic units (which, however, were not combined as in semantic structure, so that Gruber needed a system of semantic interpretation rules to relate his pre-lexical deep structure to semantic structure proper). Likewise, in his 'proof' that (5)–(6) plus 'methodological considerations of the sort that have always been part of the development of generative grammar' imply that selectional restrictions must be stated in terms of deep structure, Katz surreptitiously inserts the adjective 'syntactic' before the expression 'selectional and co-occurrence restrictions', thus assuming not only the division of a grammar into a syntactic part and a semantic part but that the selectional restrictions to which Lakoff referred must be stated in terms of the syntactic part of the grammar, and treats the absurd proposal that selectional restrictions must be stated in terms of surface structure as if it were the only alternative to the proposal that they must be stated in deep structure.

Katz divides (6) into the two pieces: (7) "The semantic component is an interpretative system that operates on phrase markers independently generated by the syntactic component to assign them a compositional semantic interpretation", and (8) "The phrase markers on which the semantic component operates are just those in K" and states that "in the present context, (8) is not at issue. The issue centers around (7), which expresses the doctrine of interpretative semantics" (222). What Katz says implies that his arguments are a defense equally of his version of 'interpretative semantics', which accepts (8), and that currently held by Chomsky, which rejects it. However, (5)+(7) says even less about what deep structure is than does (5)+(6) (=(5)+(7)+(8)) and thus leaves an adherent of (7) with even less of a basis on which he might argue that a level of deep structure is necessary. When Katz dismisses the arguments by generative semanticists that lexical insertions can not all take place at the same stage of derivations and that certain familiar transformations must apply before certain lexical insertions by saying, "free interspersal of lexical insertion is also not a point of controversy between the theories of generative and interpretative semantics", he is (at least for the moment) taking 'the theory of interpretative semantics' to be something so vacuous that no 'points of controversy' between it and any other theory are imaginable; by contrast, Chomsky, who rejects (8), accepts the claim that all lexical insertions occur together (which even Katz recognizes can not be 'proven' from (5) plus (7)) and thus avoids vacuity. Katz's elabora-

tion of the remark just quoted contains some gross inaccuracies. His statement that "Grammars fashioned on the model of generative semantics could restrict lexical substitution to a pretransformational stage" makes sense only when interpreted as meaning that a grammar in which all lexical insertions occur at the level of semantic structure would fit his definition of 'generative semantics'; Katz overlooks the fact that the actual assumptions of generative semanticists, which include the assumption that the operands of a transformation are constituents and the assumption that lexical insertions are transformations and thus subject to the latter constraint and all other valid constraints on transformations, imply that lexical insertions cannot all occur at the level of semantic structure, since there are lexical items which incorporate elements of meaning that do not all fit together into a single constituent of semantic structure, e.g. the word *kill*, which Katz discusses. Katz's statement that "Grammars fashioned on the model of interpretative semantics could allow interspersal of operations inserting lexical items among transformational operations. If grammars of the latter type were to allow interspersal, the semantic component would have to apply to some phrase markers outside of K, viz. to those derived phrase markers where lexical items not appearing in the underlying phrase markers make their appearance" repeats the gratuitous assumption that semantic interpretation rules must have lexical items in their inputs.

While Katz refrains from defending his assumption that lexical insertion takes place at deep structure, he presents a defense of his assumption that selectional restrictions must be stated in terms of deep structure and his additional claim that syntactic categories can not be identified with semantic categories. This defense is a criticism of my argument (1968b) that selectional restrictions must be stated in terms of semantic structure. Katz states that there is no need to consider my arguments for the claim that "any piece of information which may figure in the semantic representation of an item may figure in a selectional restriction", since "if sound, it supports interpretative and generative semantics alike" (235). Evidently, by 'supports', Katz simply means 'is consistent with', since it makes no more sense to speak of a respect in which deep structure is unnecessary as supporting the claim that deep structure is necessary than to speak of the demonstration that combustion products are heavier than what is burned as supporting the phlogiston theory. Katz thus allows selectional restrictions to be stated in terms of arbitrary semantic properties of an item but claims that selectional restrictions may in addition make reference to non-semantic properties and to properties (semantic or not) of deep structure. In the discussion of a selectional restriction which I had said must be stated in terms of the semantic property of denoting a name rather than the syntactic property of

'properness', namely the restriction on what the second object of *name* may be:

They named their son John.
*They named their son that/some/one boy.
They named their son something outlandish.

Katz says that the restriction should be stated in terms of a feature [+Proper]: "The point McCawley misses is that a constituent can be marked [+Proper] without being a proper noun" (236–7). Katz is apparently using [+Proper] to denote the semantic property to which I referred, and the one fact which he cites to justify calling this feature syntactic, namely the choice of interrogative pronoun in

What/*Who(m) did they name their son?

is irrelevant, since (Lakoff, 1969) choice of pronouns is made on the basis of assumptions about the individuals which they refer to or over which they range rather than any properties of lexical items. A more interesting objection to my position by Katz is his claim that there are pairs of items which are semantically identical but have different selectional restrictions. For example, he maintains that

(i) footwear
(ii) articles of wearing apparel for the feet

are semantically identical but differ in the restrictions that they impose on a determiner, which e.g. may be *much* in the case of (i) but not (ii) and may be *seven* in the case of (ii) but not (i). However, Katz's statement that (i) and (ii) are identical in meaning is not as obviously true as Katz makes it out to be. Indeed, upon a few moments reflection it becomes obvious, at least to me, that they differ in meaning in the same way as do *footwear* and *articles of footwear* or *wearing apparel for the feet* and *articles of wearing apparel for the feet*, i.e. the meaning of (ii) involves the proposition that what is referred to is individuated but the meaning of (i) does not. It is of course easy to jump to the conclusion that they are identical in meaning, since existing footwear is individuated in the same way that feet are. A more interesting case of this type (not cited by Katz) is provided by the English words *wheat* (mass noun) and *oats* (plural) and their German equivalents *Weizen* (plural) and *Hafer* (mass noun) respectively.[2] However, in this case the number seems to be an idiosyncracy of morphology (like the plural in *trousers* and *scissors*), and these items appear all to have the same selectional restrictions. There are in fact some well-known cases which may refute the strong form of the claim

[2] I am grateful to John Robert Ross for calling this example to my attention.

that selectional restrictions are semantic, i.e. the claim that selectional restrictions have to do *only* with semantic structure and have nothing directly to do with lexical items, i.e. that all selectional violations are category mistakes. For example, *essen* and *fressen* may be semantically identical except for *essen* but not *fressen* imposing a restriction that its subject 'be human'. However, it is not clear that they refer to the same *kind* of eating (which verb do you use in reporting a well-mannered chimpanzee's eating something with a knife and fork?), and if not, they are no counterexample. Even if there are counterexamples to the strong form of the claim,[3] I know of no counterexample (and Katz has provided none) to the weaker claim that a selectional restriction imposed by an item (whether by a lexical item or by a semantic item) is a presupposition about what an item in semantic structure purports to denote.

Katz also states that "the features [−Common] and [+Common] [by which Katz evidently means what he called [+Proper] and [−Proper] on the preceding page] clearly function in syntactic selection, since they determine the co-occurrence of nouns with certain determiners and relative clauses" (238). Rather than offering any justification for this claim, he treats it as too obvious to deserve comment and goes on to argue that the proper/common distinction does not correspond to any semantic distinction.[4] However, the analysis that Katz assumes for determiners (which is apparently that of Chomsky (1965): determiners are present in deep structure as constituents of NP's, and nouns which head a NP are subcategorized as to what other material may go into the NP with them) is by no means the only feasible analysis, and there are so many competing analyses of relative clauses that I cannot even tell which of them Katz has in mind. The absence of quantifiers before proper nouns follows from three propositions that are generally accepted by generative semanticists: that quantifiers originate as predicates of higher clauses (as in Figure 1, which shows the structure that I argue (in press b) to underlie *All men are mortal*; see Lakoff (1970b) for a related though significantly different proposal and for arguments for an external source for quantifiers) and are moved into their eventual NP's by a transformation that adjoins them to an occurrence of the corresponding variable, that common nouns are underlying predicates, and that proper nouns (pace Quine) are not. I am not in the position of being able to say that the absence of articles before proper names (leaving aside the definite article

[3] Abundant material which may well provide many such counterexamples is found in Leisi (1967).

[4] Katz attempts to prove this claim by arguing for a conclusion which, if it were true, would actually disprove it. His statement, "Thus, we can conclude that a proper noun, and hence the proper-common distinction, does not carry semantic import" (239), suggests that for Katz the something-nothing distinction carries no semantic import.

of *the Hague*, *the Bronx*, and river names) follows from existing claims of generative semanticists, since generative semanticists have so far said nothing of significance about articles (and interpretative semanticists have done little about articles beyond summarizing some obvious facts about surface cooccurrence); however, I see nothing in principle which gives an analysis

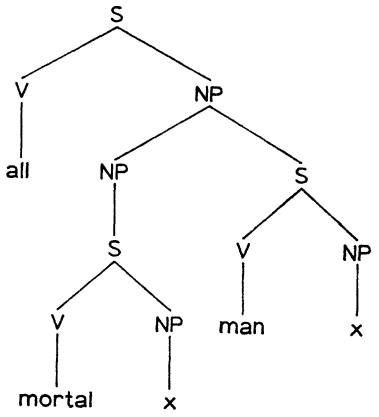

Fig. 1.

such as Katz accepts (plus God knows what semantic interpretation rules) any advantage over an alternative in which articles are inserted by transformations that are sensitive to prior mention of the thing referred to and to certain existence and uniqueness presuppositions, with the absence of articles before proper names in English (as opposed to Modern Greek) being a restriction on one of those transformations rather than on how things may be combined in deep structure. The impossibility of a restrictive relative clause modifying a proper noun would follow from any analysis in which the head noun of a relative clause construction originates as an underlying predicate (e.g. *a girl who I like* coming from a structure like that of Figure 2)

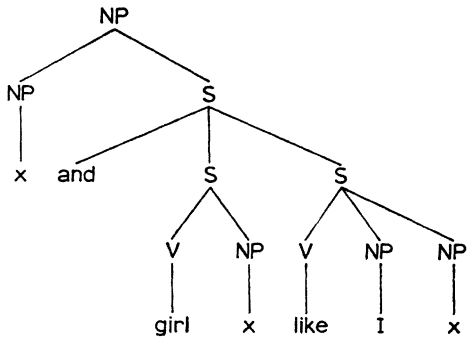

Fig. 2.

and in which common nouns but not proper nouns are underlying predicates.

One important issue which Katz touches on is that of whether syntactic and semantic structures are of the same formal nature, which generative semanticists argue is the case and have presented as evidence that the syntax/semantics dichotomy is invalid. Katz describes the claim that semantic structures are trees[5] as 'trivial'. His remark that "The utility of such apparatus seems to be a very general matter insofar as trees (or parenthesization) are relevant in every subject where hierarchical structure has to be described, e.g. in the case of biological taxonomies, genealogy, electronic circuitry, etc." suggests that he does not know what a tree is, since the circuit diagrams and genealogical diagrams which he evidently has in mind may contain loops and thus are not in general trees. While not quite as trivial as Katz says it is, the claim that semantic structures are trees is relatively trivial unless combined with claims about what may appear as labels in those trees, and generative semanticists have some highly specific claims as to what labels may appear on the nodes of a semantic structure, in particular, the claim that exactly the same labels for non-terminal nodes are needed in semantic structure as in surface structure. Katz attributes to generative semanticists the claim that constituents of semantic structure "can be properly categorized as nouns, noun phrases, verbs, verb phrases, adjectives, and so on" (233), an attribution which evidently results from Katz's combining the claim of the last sentence with his own conception of what node labels are needed in surface structure. However, Katz surely has seen works such as Lakoff (1965) and Bach (1968), which argue that the verb/adjective/noun distinction has nothing to do with non-terminal node labels, that verbs, nouns, and adjectives all belong to a single underlying category (which Bach called 'contentive', and Lakoff, in accordance with the position that 'verb' is the 'least marked' of the three categories, called 'verb'). The paper of mine (1967) which Katz quoted was not very explicit as to what non-terminal node labels were necessary, but more recent papers by Lakoff and me have made explicit the claim that only three non-terminal node labels (S, NP, V) are needed and that these categories match in slightly broadened form categories used by logicians: S corresponds to the use of 'sentence' in the terms 'closed sentence' (='proposition') and 'open sentence' (='propositional function'), V to 'predicate' (taken as including 'operator'), and NP to 'argument'. Thus, Katz's arguments that there is no semantic property characterising surface nouns, etc. have no bearing on any claim ever made by any proponent of generative semantics.

Finally, let me take up briefly some miscellaneous objections by Katz to

[5] See McCawley (1968a) for discussion of the sense of 'tree' intended here.

generative semantics. His objection that a grammar must be 'compositional' in the sense quoted above or else "it will fail to account for how speakers with a small finite storage capacity can understand the meaning of the indefinitely large (and theoretically infinite) set of sentences of their language" (242) is preposterous: this ability requires that the rules relating semantic structure to surface structure be finite in number and applicable to an infinite range of cases but says nothing about whether those rules must involve the division of grammar into a syntactic and a semantic part which Katz's definition of 'compositional' presupposes. Equally preposterous is Katz's objection that a generative semanticist requires some kind of semantic interpretation rule to tell whether the structure from which he would derive *John killed Bill* "represents the proposition that John killed Bill, the proposition that Bill killed John, the proposition that both were killed, or the proposition that both are killers" (248). The structure to which Katz refers[6] contains a predicate 'Cause', whose arguments are 'John' and a sentence (Become (Not (Alive (Bill)))); both 'John' and 'Bill' have unambiguous roles in that structure, and the information that Katz's 'projection rule' would derive from it is already there explicitly. Not much less trivial is Katz's objection that generative semantics requires rules that interpretative semantics does not, viz. rules like

V→(Cause)
V→(Become)
...
N→(John),

which would specify what ultimate items can occur in semantic structure. Generative semantics does in fact require rules saying that in semantic structure a node labeled V may dominate a node labeled CAUSE, etc.; however, these rules are not context-free, as Katz has them, but must indicate e.g. that CAUSE takes two arguments, one an index and the other a sentence, and that NOT takes a single argument, which must be a sentence. However, such rules serve to do what any grammar must do, namely to exclude sentences such as

*Tom caused.
*Tom caused the vice-chancellor.
*Tom caused the vice-chancellor the explosion.

[6] The tree which Katz 'quotes' contains one spurious constituent, namely that which Katz labels 'Aux'. While the article of mine (1968c) to which Katz refers does not indicate where the tense would originate, I have argued elsewhere (in press b) that tenses are verbs (and thus that there is no such constituent as 'Aux'; in this connection see also Ross (1969)) and have indicated that the tense would originate 'higher' than where the tree that Katz attributed to me has it.

while allowing

> Tom caused the explosion.

One can do without such rules, if at all, only at the expense of incorporating some analogue of them into rules which may occur at some later stage of derivations, e.g. deep structure. The issue here is not whether certain rules are needed but what stage of a derivation 'strict subcategorization' (in the sense of Chomsky (1965)) has to do with.

Katz's argument that "generative semantics type grammars cannot account for cases of semantically anomalous sentences which are syntactically well-formed" is of appreciably more interest than the objections just discussed but still does not stand up. Katz does not take up explicitly the question of whether the status of 'semantically deviant' sentences is to be decided purely on the basis of grammar or on the basis of grammar plus logical rules of inference, but his treatment of sentences such as *John sold his after-image to Robert* makes clear that he holds the former view. My reaction to that sentence is that the source of its oddity is that selling involves transfer of ownership and that an after-image is something that it makes no sense to speak of someone's owning; the same oddity appears more directly in *Robert owns John's after-image*. I take the position that such oddities consist in nothing more nor less than contradictions between presuppositions, not presuppositions of the words of the sentence per se but of semantic elements that are incorporated into them (e.g. the 'own' that is incorporated into *sell*), and that not only grammar but indeed the whole of logic is involved in determining when such a contradiction exists. For example, the oddity of the discourse

> John looked at his jacket and then at his reflection. Both of those things are waterproof.

(which is the same oddity as in Katz's example *John's reflection is waterproof*) cannot be shown to exist without applying the rule of universal instantiation to the second sentence (thus concluding that '*m* is waterproof', where *m* is the second of the two things) and deriving a contradiction from the presuppositions of that clause and '*m* is John's reflection', which comes from the first sentence. Thus, Katz is technically right that "generative semantics type grammars cannot account for cases of semantically anomalous sentences which are syntactically well-formed", but that is no objection: an adequate account of such sentences requires interaction between grammar and (natural) logic, and Katz has exhibited no defect in the grammar which generative semantics can provide for natural logic to interact with. Another objection that Katz makes in this connection is based either on an equivoca-

tion with the word 'generate' or on nothing at all. Katz says that the generative semanticist's only 'way out' of the problem that he has just posed is to "design the semantic component[7] to generate two sets, one a set of representations of fully meaningful senses of sentences, and the other, a set of representations of non-senses, including various degrees of conceptual garble" (255). This passage may be a rare instance in which Katz (who is usually careful about the distinction) uses 'generate' in the sense of 'cause to come off the assembly line of a sentence factory' rather than in the mathematical and linguistic sense of 'specify what the members of – are'. If a grammar is a set of constraints on derivations, then many subsets of that grammar will also define classes of derivations (generally a larger class of derivations than that defined by the whole grammar). Thus, if selectional restrictions are in fact to be treated wholly within grammar and if each selectional restriction is itself a derivational constraint, then both the whole grammar and the subset of the grammar obtained by omitting the selectional restrictions define classes of derivations. To put the same point slightly differently, given a grammar and a putative derivation, one could tell whether the derivation satisfies all the rules of the grammar, whether it satisfies all the rules but some selectional restrictions, etc. However, that fact is of no more significance than the fact that a grammar containing a number-agreement rule not only defines the class of all well-formed derivations but also the class of derivations which are well-formed except for incorrect number agreement.

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[7] Katz's choice of terminology is confusing, since linguists (including Katz elsewhere in the same paper) have hitherto used 'semantic component', if at all, to refer to a system of rules that specify what semantic structures correspond to what syntactic structures. The rules to which he refers here are more analogous to the 'base rules' of Chomsky's *Aspects* than to its 'semantic component'.

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