

Remarks on Meaning-Preservingness of Transformations

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1. Introduction

Since Katz and Postal (1964), the meaning-preservingness condition of transformations has been recognized as one of the basic theoretical assumptions of the theory of generative-transformational grammar.¹ Katz and Postal (1964) have proposed this condition for the following reasons. First, it motivates better the postulation of grammatical transformations in generative grammar by allowing of the most generalized conception of transformation; i.e., the hypothesis that all transformations preserve meaning is the more generalized, therefore preferable, one than the hypothesis that all transformations affect meaning or the hypothesis that some transformations preserve meaning while others affect meaning.² Second, it simplifies the semantic component by allowing semantic projection rules to apply only to underlying structures; in other words, if all transformations preserve meaning, semantic projection rules need not apply to derived or surface structures. Third, all of the then proposed transformations can be motivated to comply with the meaning-preservingness condition. These motivations for the meaning-preservingness condition of transformations by Katz and Postal(1964) are not fully accepted by all generative grammarians now, but still considered as the general foundation for the discussion of the meaning-preservingness condition of transformations.

¹ Some generative grammarians, especially so-called interpretive semanticists, no longer maintain that all transformations preserve meaning, i.e., they claim that some transformations change meaning. But they agree that in general transformations preserve meaning; furthermore, they believe that the kinds of meaning that transformations may change or affect are quite limited, e.g., they are limited to scope of logical and adverbial operators, coreference relations, focus-presupposition, etc.

² It is clear that the hypothesis that all transformations preserve meaning is the more generalized, therefore preferable, one than the hypothesis that only some transformations preserve meaning while others do not. But one might suspect that the former is neither more nor less generalized than the hypothesis that all transformations affect meaning since both of the hypotheses characterize transformations uniformly. Note, however, that the latter hypothesis has to specify for each transformation how it affects meaning since the manner in which each transformation affects meaning would not be the same in all cases.

The two currently opposing theories in generative grammar, the interpretive semantics and the generative semantics, take different positions on the meaning-preservingness condition. Interpretive semanticists claim that transformations may affect meaning to a certain extent (cf. footnote 1) and thus semantic interpretive rules should apply to derived or even surface structures as well as to underlying structures. Generative semanticists claim that all transformations preserve meaning and further that underlying structures are semantic structures so that there is no such thing as semantic interpretive rules. Thus, Katz and Postal's (1964) meaning-preservingness hypothesis of transformations is still one of the fundamental issues in the theory of generative grammar.

The purpose of this paper is to discuss current issues and problems in generative grammar with respect to the meaning-preservingness hypothesis of transformations.

2. The Notion of Synonymy

Consider the sentences in (1)

- (1) a. John saw the play yesterday.
- b. The play was seen by John yesterday.
- c. The play John saw yesterday.
- d. The play, John saw it yesterday.
- e. Yesterday John saw the play.

It is generally assumed that the sentences (1b, c, d, e) are derived from (1a) or its underlying structure, by Passive,³ Topicalization, Dislocation and Adverb Preposing respectively. According to Katz and Postal (1964), the sentences in (1) are *cognitively* synonymous with each other and thus those transformations relating them are meaning-preserving. That is, in Katz and Postal (1964), the criterion for meaning-preservingness of transformations is based on cognitive synonymy, and whatever semantic differences exist among (1a, b, c, d, e) are relegated stylistic variations and assumed to be out of linguistics proper. However, no generative grammarians would now feel comfortable with such treatment of what we might call non-cognitive meaning differences as revealed among (1a, b, c, d, e), even if we do not have any well-motivated theoretical devices to deal with them yet. Explicit characterization of such non-cognitive meaning is significant since it will contribute to characterization of the semantic functions of transformations. For example, Hinds (1974) claims that the Passive transformation is not a semantically

³ According to Katz and Postal (1964) and Chomsky (1965), the passive transformation does not derive a passive structure from its active counterpart, but from a structure for the active counterpart along with a dummy manner phrase PASSIVE; therefore, the passive transformation does not directly relate a pair of active and passive sentences. However, it has been generally assumed in most of recent transformational grammatical literature that the passive transformation is an optional rule deriving a passive structure from its active counterpart, which I adopt in this paper.

neutral operation but has a semantic function of maintaining the so-called theme-rheme⁴ structure by moving essentially rhematic material to the end of the sentence and thematic material to the beginning of the sentence. As evidence of this, he argues, none of (2a, b, c), in which the derived subject is rhematic as indicated by the preceding indefinite article, are perfectly natural, given neutral contexts and neutral intonation contours.

- (2) a. ??A house was struck by the train.
 b. ??A man was run over by the electric car.
 c. ??A house was demolished by the bomb.

Now the question is how to capture or characterize the functions of such non-cognitive meanings as 'theme', 'rheme', etc., in our grammar. Generative semanticists claim that most of such meanings should be represented as part of the constituent structure in the underlying structure and can be related to their corresponding surface structure manifestations by global rules. On the other hand, interpretive semanticists claim that they should be interpreted out of derived or surface structures by semantic interpretive rules. Notice that in either of the two theories it can no longer be maintained that synonymy is characterized by optional transformations, and further that it is not clear whether the notion of synonymy can be explicitly defined at all in either of the theories, once the notion of 'cognitive synonymy' is abandoned.⁵ Without explicit definition or characterization of synonymy, it is hard to discuss the notion of 'meaning-preservingness' at all. Further problems with the above-mentioned positions of generative semantics and interpretive semantics will be discussed in sections 3 and 4 below respectively.

3. Semantically Fully-Specified Underlying Structure

In dealing with more than the so-called 'cognitive' meanings in our grammar while maintaining the meaning-preservingness condition of transformations, generative semanticists have found that underlying structures have to be semantically more specified than in Katz and Postal (1964) or Chomsky (1965). Now the issue is how to motivate such semantically specified underlying structures. Even if underlying structures are *semantically* specified⁶ they have to be *syntactically* as well as semantically motivated⁷; otherwise, the

⁴ The concept of the 'theme-rheme' structure is due to the Czech linguist Firbas. His concept 'theme' roughly corresponds to the traditional notion of 'old information' and his concept 'rheme' to the traditional notion of 'new information.' His so-called Functional Sentence Perspective or the principle of 'theme-rheme' structure is that in a normal neutral sentence structure the theme comes first and the rheme comes last. For detailed discussion of 'theme-rheme' structure, see Firbas(1966). For further critical discussion of it, see Yang(1974).

⁵ For further discussion of linguistic characterization of the notion 'synonymy', see Yang(1970).

⁶ In fact, generative semanticists claim that underlying structures *are* semantic structures, which are represented as constituent structures like traditional deep structures.

⁷ Given the current state of affairs in the theory of generative grammar, it is hard to draw a clear-cut distinction between syntax and semantics. By *syntactic* motivation of constituent structures here I mean motivation in terms of well-motivated *transformations*.

transformational relation between the underlying structure and the surface structure would be *ad hoc*. And syntactic motivation for such underlying semantic structures has generally been rather weak. For example, Lakoff (1971a) claims that such semantic notions as 'topic', 'focus' and 'presupposition' be explicitly represented in the underlying semantic structures and that they can be related to their corresponding surface constituents by a global derivational constraint. He states (Lakoff 1971a: 261):

Given such a notion (global derivational constraint), the correspondence between PR(=presupposition) and FOC(=Focus), which are part of the semantic representation, and the corresponding surface constituents can be stated by a global derivational constraint.

But obviously the ability or power of the global derivational constraint to relate such underlying semantic elements to their corresponding surface constituents cannot and must not be considered as any motivation for such notions as 'focus' and 'presupposition' to be represented in the underlying structure. Furthermore, due to the exceptional power of the global derivational constraint, it is almost impossible to motivate unique specification of such semantic notions in the underlying structure. In other words, in whatever way we might specify such semantic notions in the underlying structure, we can still devise a global derivational constraint to relate them to their corresponding surface constituents. This leads to arbitrariness or *ad hocness* of underlying (semantic) structures. On the other hand, if indeed every possible bit of semantic information of a sentence is to be postulated in the underlying structure, then all transformations relating so-called 'stylistic variations' of sentences would become obligatory ones triggered by relevant semantic elements postulated in the underlying structure; i.e., there would be no optional transformations, which means that the notion of stylistic variation or cognitive synonymy would no longer be characterized by transformations. This innovation of 'no optional transformation' can be motivated only if the semantically fully-specified underlying structure can be *syntactically* motivated. And if indeed the question of meaning-preservingness can be meaningfully asked only of optional rules as Partee (1971) argues, then the postulation of such semantically fully-specified underlying structures, which allows of no optional transformation, would make the question of meaning-preservingness vacuous.

As one way of obviating such difficulties, Lakoff (1971a) proposes to relax the generative semanticists' semantic sufficiency condition of underlying structure and to allow transformations to affect meaning in certain limited ways. For example, he argues that (3b) is to be derived from a structure underlying (3a) though (3a, b) are not completely synonymous.

- (3) a. John ceased to know his native language.
 b. John forgot his native language.

In other words, he claims that (3a, b) be related by an optional transformation which affects meaning in a certain limited way. That is, he argues, the only requirement for a

transformation to derive a constituent X from a constituent Y is that the meaning of the constituent Y be contained in the meaning of the constituent X . And in the case of (3a, b), indeed the meaning of *cease to know* is contained in the meaning of *forget*; therefore, he argues, *forget* can be derived from *cease to know*. But this 'meaning inclusion' exception to the meaning-preservingness condition of transformations has yet to be adequately motivated.

4. Meaning Change of Transformations

In order to maintain syntactically most general transformational rules, interpretive semanticists had to allow transformations to affect not only 'non-cognitive' meaning but also 'cognitive' meaning of a sentence. For example, they claim that the same passive transformation that derives (1b) from (1a) should derive (4b) from (4a).

- (4) a. Everyone in the room knows two languages.
 b. Two languages are known by everyone.

(1b) is a stylistic variant of (1a), but (4b) is not a stylistic variant of (4a). Thus, interpretive semanticists' semantic interpretive rules applying to passive structures have to sort out not only such 'non-cognitive' meaning differences as between (1a) and (1b) but also such 'cognitive' meaning differences as between (4a) and (4b).

It is often, however, problematic to explicitly characterize meaning change of transformations, especially in the cases of 'cognitive' meaning change as in (4). Consider (5a, b), in which *something* is assumed to be nonspecific so that (5a, b) are distinct in meaning like (4a, b).

- (5) a. Everyone knows something.
 b. Something is known by everyone.

The meaning difference between (5a) and (5b) may be represented as in (6a, b) according to symbolic logic notations:

- (6) a. $(\forall x)(\exists y)$ [know(x,y)]
 b. $(\exists y)(\forall x)$ [know(x,y)]

where x refers to *man* and y to *thing*. (6a) represents the meaning of (5a) and (6b) the meaning of (5b). Note that the order of the universal and existential quantifiers in (6a, b) corresponds to the order of *every* and *some* in (5a, b). Indeed interpretive semanticists' scope interpretive rule determines the order of the universal and existential quantifiers in the semantic interpretation of such sentences as (5a, b) according to the order of words like *all* or *every* and words like *some* in such sentences. Thus, it would be most natural to assume that the same scope interpretive rule that determines the order of quantifiers $(\exists y)(\forall x)$ in the semantic interpretation (6b) for the passive sentence (5b) would also determine the order of quantifiers $(\forall x)(\exists y)$ in the semantic interpretation (6a) for the active sentence (5a). If indeed the information of quantification, $(\exists y)(\forall x)$ and $(\forall x)(\exists y)$, in the semantic interpretation of both sentences (5a, b) is to be deter-

mined by a surface structure scope interpretive rule, the underlying structure for (5a, b) would have only to contain the information of the proposition $[\text{know}(x,y)]$, since specification of any of the quantification information in the underlying structure would be redundant as long as we have the surface structure scope interpretive rule. Now the underlying structure semantic information $[\text{know}(x,y)]$ is different from either of (6a, b). We can say that the semantic difference between the underlying semantic information $[\text{know}(x,y)]$ and (6b) is due to the meaning-changing passive transformation. But how can we account for the semantic difference between the underlying semantic information $[\text{know}(x,y)]$ and (6a)? Shall we say that the semantic difference is due to non-application of the passive transformation? If interpretive semanticists insist that the semantic information of the deep structure for (5a, b) is not $[\text{know}(x,y)]$ but (6a), then they should somehow justify the inconsistency of saying that the quantification information, $(\forall x)(\exists y)$, of (6a) is determined by a deep structure interpretive rule while the quantification information, $(\exists y)(\forall x)$, of (6b) is determined by a surface structure interpretive rule.

5. Interaction between Grammar and Logic

It has been assumed that the generative semanticists' meaning-preservingness hypothesis of transformations entails the semantically fully-specified underlying structure. McCawley (1971), however, claims that not all the semantic properties of a sentence can be specified in the underlying structure in the grammar. For example, contradictoriness of a sentence, he argues, is not to be specified in the underlying structure of the sentence, but is to be determined by logical rules of inference, which are independent of grammar. Thus, according to him, the underlying semantic structure of a sentence does not represent the complete set of semantic properties of the sentence, and the additional semantic properties besides those of the underlying structure are to be obtained through interaction between grammar and logic. To what extent and how the interaction between grammar and logic would determine the semantic aspects of a sentence is yet to be motivated.

6. Contextual Meaning

Another aspect of meaning that is linguistically significant but is assumed not to be specified in the underlying structure is extralinguistic context including belief context. For example, Lakoff (1971b) assumes that the belief that it is undesirable to be thought of as a Republican, which one must hold if he is to utter (7) felicitously, is not to be specified in the underlying structure of (7).

(7) John called Mary a Republican, and then she insulted him.

McCawley (1973) also argues that (8a, b) have the same underlying semantic structure, differing only in the context in which they are appropriate, i.e., that (8b) can only be used appropriately by someone who believes the neighbor to be a woman.

(8) a. My neighbor hates himself.

b. My neighbor hates herself.

Note that in the case of (8a, b) the extralinguistic context plays a role in the proper operation of the reflexive transformation. Thompson (1971) suggests that even the distinction between the definite and indefinite articles would not be specified in the underlying structure but be introduced at some level of derivation by a transformation, since 'the choice of the determiner will in general correlate with certain presuppositions which the speaker makes about the extent of his listener's knowledge.'

The major reason why the linguistically significant extralinguistic contextual meaning is not to be postulated in the underlying semantic structure is that currently it is extremely difficult to motivate the postulation of such extralinguistic contextual meaning in the underlying structure. On the other hand, transformational introduction of such contextual meaning would directly violate the meaning-preservingness condition of transformations. Thus it would be worthwhile to explore the possibility of postulating a system of extralinguistic context as being independent of grammar but interacting with grammar, as is the case with logic interacting with grammar.

7. A Concluding Remark

It is clear that there is no *a priori* reason why the meaning-preservingness condition of transformations should be maintained or discarded. The issue is empirical as well as theoretical. The issue also crucially depends on how we define the notion 'meaning' in our grammatical theory. It is, however, methodologically useful to start explorations into semantic effects of transformations from the meaning-preservingness hypothesis. The explorations into semantic effects of transformations are now significant since we can no longer do autonomous syntax entirely separated from semantics.

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