ON KATZ-POSTAL INTEGRATED THEORY OF LINGUISTIC DESCRIPTIONS

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In 1963 J. J. Katz and J. A. Fodor in their »The Structure of a Semantic Theory« encouraged semantic studies and proposed to consider semantics as an integral part of generative grammar. Next year J. J. Katz and P. M. Postal in »An Integrated Theory of Linguistic Description« tried to integrate generative concepts of phonology and syntax proposed by Chomsky with semantics; they also aimed to provide an adequate means of incorporating grammatical and semantic description of a language into one integrated description.

Of the three components of any linguistic description *syntactic component* represents generative source, generates the *abstract formal structures* that underlie actual sentence; *semantic* and *phonological components* operate on the syntactic output, perform independent operations on the syntactic structures and provide respectively *semantic interpretation* and *phonological representation* to each of the formal structures generated by the syntactic component.

The syntactic component must be a *system of rules* that enumerates the infinite set of abstract formal structures; the rules assign one or more *structural descriptions* to each string of formatives.

The semantic component consists of a *dictionary*, containing meanings of each lexical item of a language, and a finite set of *projection rules*. String of formatives is given the meaning from the dictionary; projection rules provide semantic interpretation of each element of the string, combining the meanings *according* to the syntactic description of the string.

This paper explains their theory and proceedings in detail.

Since Chomsky's *Syntactic Structures* (1957) many generative studies concerning formal syntactic features of a language have been promoted; however a few of them treated the relations of the syntactic structure to the meaning.

It was Katz and Fodor's proposal to make semantics an integral part of generative grammar, contained in *»The Structure of a Semantic Theory«*[1] (1963) that encouraged the semantic studies. Since that time it was generally assumed that a complete linguistic description must include meaning.

This approach is developed and extended in Katz and Postal's *An Integrated Theory of Linguistic Descriptions* (1964)[2] as an attempt to integrate the generative concepts of phonology and syntax proposed by Chomsky with that of semantics.

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[1] J. J. Katz — Fodor, J. A.: »The Structure of a Semantic Theory«, *Language*, 39/1963, pp. 170—210.

[2] J. J. Katz — Postal, P. M.: *An Integrated Theory of Linguistic Descriptions*, Cambridge, MIT Press, 1964.

The major Katz and Postal's aim is »to provide an adequate means of incorporating the grammatical and the semantic descriptions of a language into one integrated description.« (X)

The present paper will outline their theory.[3]

A linguistic description of natural languages attempts to reveal and reconstruct the principles underlying the speakers' ability to produce sentences and understand those produces by other speakers.

Theoretical reconstruction is presented in form of »statements that represent the linguistic structure characteristic of the language« (1); at the same time they enable the linguists to explain sentence use and comprenhension.

In constructing »an integrated conception of the nature of a linguistic description of a natural language« (1) Katz and Postal state tripartite theory corresponding to the three components of a linguistic description of a natural language: *syntactic, semantic* and *phonological.*

Of the three, the *syntactic component* appears to be of the fundamental importance; it is »the generative source in the linguistic description (...), it generates the *abstract formal structures* underlying actual sentences.« (1)

These formal structures are made of *formatives* (a string of the minimal syntactically functioning elements) and of *structural description* »specifying the syntactic properties of the string.« (1)

The other two components, i. e., *semantic* and *phonological* operate on the syntactic output and perform independent operations on the syntactic structures; they provide, respectively, a *semantic interpretation* and *phonological representation* to each of the formal structures generated by the syntactic component.

The *(inter)connections* of the syntactic and semantic components are the main Katz and Postal's concern. So far these relations have not been studied in the satisfactory way primarily because of the controversies of American linguistics to regard semantic consideration implicative of the syntactic component, and because of the lack of clear conception of the internal structure of the semantic component.

This situation changed in 1963, the year of the publication of Katz and Fodor's »The Structure of a Semantic Theory«. Stating that the semantic and syntactic relations no more inexplicable, the methodological base of allowing to consider »the internal structure of one component based on arguments in which considerations from the sphere of the other component play a significant justificatory role« (3) were given, as well as the explicit proposal concerning the internal structure of the semantic component itself.

In this book Katz and Postal hope to accomplish two objectives: first, to extend and revise the conception of the semantic component originally presented in »The Structure of a Semantic Theory«, and second, to explore the implications that these extensions and revisions may have for the internal structure of the syntactic component.

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[3] All diagrams and examples are taken from their book. The numbers in brackets after citations refer to the page in the book.

The Syntactic Component

»The syntactic component of a linguistic description of a natural language must be a *system of rules* which enumerates the infinite set of abstract formal structures which underlie the sentences of the language. (...) Such a system assigns to each string of formatives generated one or more *structural descriptions* (SD henceforth) in the form of a finite sequence of labeled bracketings — *phrase markers* (P-markers) and a *transformational markers (T-markers)* — which indicate the configurations of transformations applied in the derivation of the string of formatives«. (6)

A *transformational syntactic component* contains two different kinds of rules:

1) rules contained in the phrase structure subcomponent that operate on the fixed string of symbols; each of the rules replaces only one single symbol of the string in each successive line, beginning with the initial sequence, as in:

a) Sentence → Noun Phrase + Verb Phrase
b) Noun Phrase → John
c) Noun Phrase → truth
d) Verb Phrase → Verb + Noun Phrase
e) Verb → love + s

that are transformed in the following way:

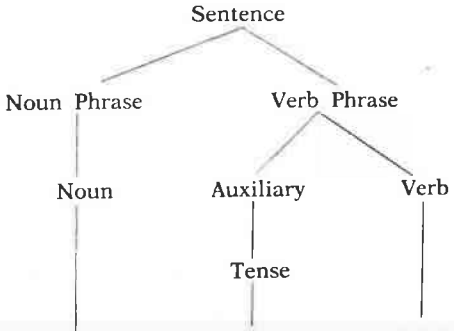
a) Sentence → Noun Phrase + Verb Phrase
b) John + Verb Phrase
c) John + Verb + Noun Phrase
d) John + love + s + Noun Phrase
e) John + loves + truth

Here we see that the transformations operate on the P-markers in order to produce new P-markers.

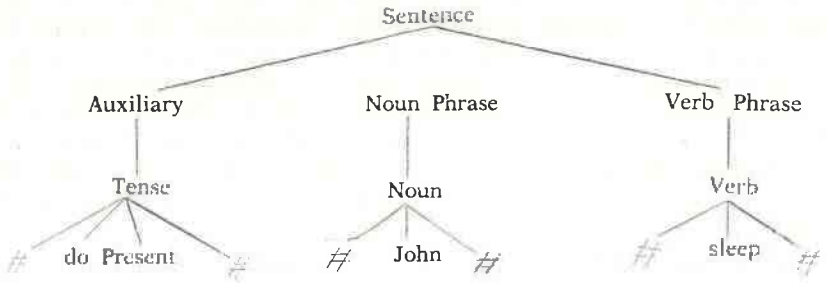
2) It is very important to make distinction between the P-markers that are derived by the phrase structure component from those P-markers that are derived by the transformational rules. The rules of the transformational syntactic component operate only on the former P-markers: that's why these are called *underlying P-markers;* they derive new P-markers called *derived P-markers.* If we take for example the sentence

»does John sleep«

the diagram that follows represents its underlying P-markers:



This other diagram represents one of its possible derived P-markers:



The terminal symbols of the underlying P-markers are called *morphemes;* »among the derived P-markers for any sentence is the last one, which is the result of application of all transformations in that sentence's T-markers. This is referred to as the *final derived* P-marker.« (8) The elements, the last line is consisted of, are *formatives.* The last line is, then, the actual *string of formatives,* namely, the actual string of words the sentence contains.

The Semantic Component

The semantic component, seen as a projective device in the sense Katz and Fodor attributed to it in their »Structure of a Semantic Theory«, consists of two parts:

1) a *dictionary,* containing a meaning of each lexical item of the language,
2) a finite set of *projection rules.*

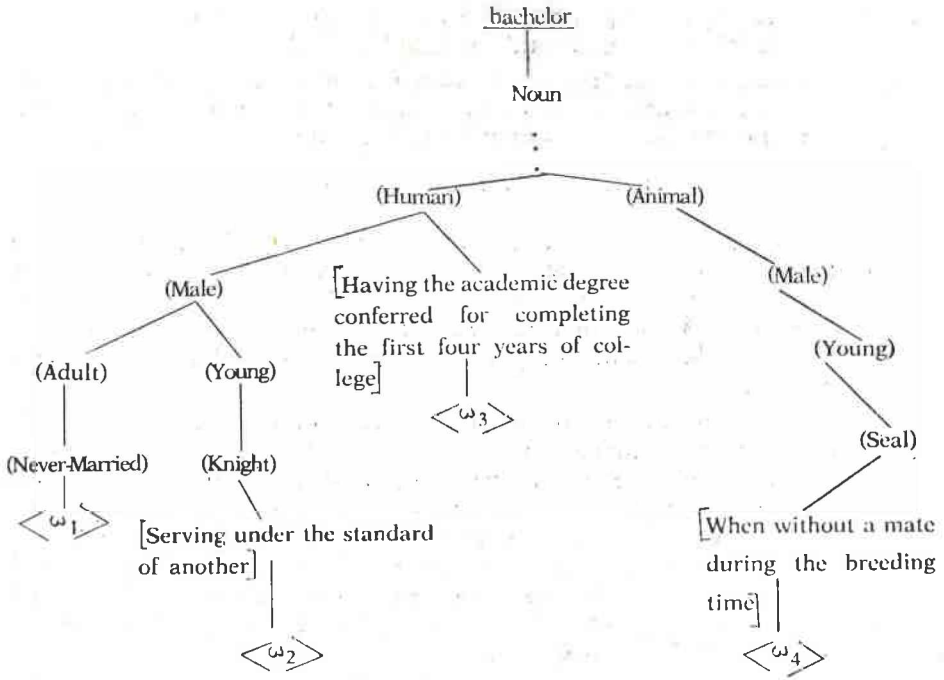
Lexical items, a string of formatives that the actual sentence consists of, are given the meaning from the dictionary; projection rules provide a semantic interpretation to each element of the string of formatives, combining these meanings according to the syntactic description of the string, in order to reach the »characterization of the meaning of the whole string and each of its constituents.« (12)

Lexical items have to be presented in a *normal form* in the dictionary, e. g., contain all pieces of semantic information relevant to each lexical item, give the detailed analysis of its meaning that results from the previous decomposition of the meaning »into its most elementary components« (13), so that projection rules can assign the correct semantic interpretation to the string of formatives.

The normal form of a lexical item presented in the dictionary comprises:

a) *syntactic marker(s),* unenclosed,
b) *semantic markers,* enclosed in parenthesis,
c) optionally, a *distinguisher,* within the brackets,
d) *selection restriction,* enclosed in angles.

The entry may also be presented in the form of a tree diagram, as, for example, in the lexical item *bachelor:*



Each complete sequence, seen vertically, standing for distinct meaning of the lexical item, is referred to as *reading*. In the above tree diagram the lexical item *bachelor* is represented as being four-ways semantically ambiguous item, namely, having four readings, four different meanings.

a) *Syntactic markers* specify the senses of a lexical item according to their belonging to different »parts of speech«; so they differentiate the senses of the lexical item *kill*, when used as a Verb, from the sense it has when used as a Noun.

b) *Semantic markers* are formal elements employed to express *general semantic properties;* therefore they can appear and, in fact, do appear more than once in the readings of the same lexical item as well as in the readings of other lexical items. See for ex. the semantic marker (Human) and (Male) in the first two readings of the lexical item *bachelor*, or (Human) in the first three readings of the same item.

c) Unlike them, the *distinguishers* are formal elements that represent what is »*idiosyncratic* about the meaning of the lexical item« (14) and help to differentiate one lexical item from the other one that is the closest to it in meaning. Therefore, the distinguisher appears only once in the dictionary. See for ex. the distinguishers for the lexical item *bachelor:* [Serving under the standard of another], or [When without a mate during the breeding time].

Such decomposition of the meaning of the lexical item into syntactic, semantic markers and distinguishers is possible because the meaning of the lexical item is not »undifferentiated whole« (14); it is rather an analyzable unit, which can be analysed into »atomic conceptual elements« (14), interrelated in different ways. Each semantic marker and each distinguisher stand for one of the atomic concepts. The reading of the meaning of the whole lexical item results from the synthesis of

all atomic concepts, or to put it into Katz and Postal's words: »Readings represent synthesizations of atomic concepts.« (14)

d) A lexical item having more than one meaning (reading) is said to be *ambiguous*. The ambiguity of the lexical item can cause a semantic ambiguity in the syntactically unambiguous sentence, as e. g. in:

he enjoys wearing a light suit in the summer

»(...) therefore, each reading in the dictionary entry for a lexical item must contain a *selection restriction*, i. e. a formally expressed necessary condition for that reading to combine with others« (15); for readings are combined with other readings and the selection restriction limits their combinability, allowing only those combinations that are semantically acceptable.

The lexical item *honest*, for example, will contain, besides syntactic markers and semantic markers: Adjective → (Evaluative) → (Moral) → [Innocent of illicit sexual intercourse], also a selection restriction: < (Human), and (Female) >, that imposes that this item, used as a modifier can be combined with, and modify only (nominal) head, if it (head) contain both semantic markers (Human) and (Female). The nominal head *woman* satisfies this restriction and combination honest *woman* can be derived, having semantically accepted meaning of »a woman who is not guilty of illicit sexual intercourse.« (16)

On the contrary the combination such as *honest geranium* can not be derived, because the head *geranium* does not contain the markers such as are required by the selection restriction for *honest*. This combination is said to be *semantically anomalous*.

The interrelation of certain pairs of semantic markers can be used to save the number of their representations throughout dictionary; namely, in order to avoid citing all semantic markers, only *some of them* may be stated, others being included in the previous ones. Thus, for ex. the semantic marker (Human) is conceptually subcategorial to and included implicitly in the categories already represented by the semantic markers (Animal), (Higher Animal) and (Physical Object). This, — the *category inclusion relation* —, if stated once at the beginning of the dictionary, or specified within the general theory of linguistic description need not be repeated further on.

At this stage a *category inclusion rule* can be formulated: if a dictionary for a certain lexical item »contains a semantic marker (M_2) which is specified as representing a category that is included in the category represented by the semantic marker (M_1), then this reading need not mention the marker (M_1), since membership in the category (M_1) is implicitly determined by the presence of (M_2).« (17)

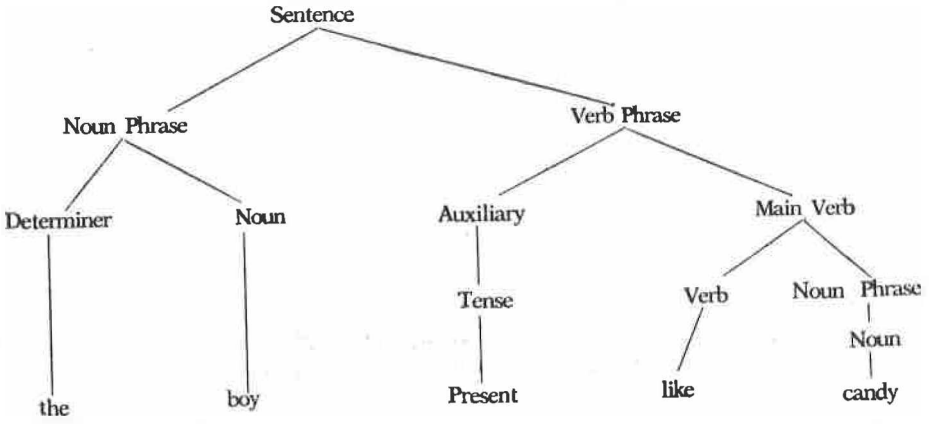
Besides this practical advantage of avoiding redundancy and saving symbols representing the semantic markers from which the meanings of lexical items are built, such economy has its theoretical side too: it enables a general theory of linguistic description »to state certain abstract truths about the dictionary entries of particular languages and about universal semantic facts of all languages,« (17) providing generalizations of the semantic properties of languages.

Let us now discuss the *operation of projection rules*, namely, »the process of assigning a semantic interpretation to a sentence.« (17)

Be given the sentence

the boy likes candy

and represented in a tree diagram as:



We already know that semantic component provides semantic interpretation to the syntactic output. First, it associates the readings to each of the lexical items this sentence consists of, but one should emphasize, only those readings »that are compatible with the syntactic categorization« (18) of these items. Thus, the lexical item *candy,* being labeled in a tree diagram in syntactic categorization as a Noun, will be given only the meaning it has as a Noun and none of those it has when used as a Verb.

Next step in this process will be to combine the readings assigned to each lexical items to others in order to form *derived readings;* these are later combined with other derived readings until the meaning of the whole sentence is reached.

We have seen so far that syntactic structure of a sentence plays a crucial role in this process of operation of projection rules in the sense that it, providing the formal relations between the lexical items, determines which combinations of meanings are possible and which are not in a sentence. In other words, it permits some of the semantic information of the lexical item to be combined by the projection rules, and forbids the other.

Another condition determined by the syntactic structure and imposed upon the semantic interpretation of a sentence is that of *adequacy;* namely, a syntactic structure given by the set of P-markers and the T-markers in the SD, the semantic interpretation has to be accomplished on *each* and *every constituent* of the P-markers, but not on *any* of their substrings; meaning has to be assigned as the *reading for the node* that dominates immediately two constituents whose meanings are combined. For ex. the semantic interpretation must, at first stage, represent the meanings of the constituents of the sentence

the man hit the ball

as: *the, man, hit, the, ball,* then proceed to the second stage and represent the meaning of: *the man, hit the ball,* and finally arrive to the meaning of the whole sentence: *the man hit the ball.* It must not provide the meaning of substrings such as: *the man hit,* or *hit the.*

Type l projection rules (henceforth P1) combine »the readings of lower-order constituents to form readings for higher-order constituents« (20), i. e., to produce new, derived meanings, until the meaning of the highest constituent -sentence- is obtained.

New, derived meanings are reached by amalgamating and »by embedding readings into one another« (20), proceeding from the bottom to the top of a P-marker. But amalgamation affects only those readings that are associated with the nodes branching from the same node labeled. Therefore, »amalgamation is the operation of forming a composite reading made up of a reading from each of the sets of readings dominated by a given node in a P-marker.« (21) It has to satisfy the condition of selection restriction, too.

Thus, one has a case of amalgamation produced by P1 when we join the reading of

the modifier *colorful* → Adjective → (Color)→ [Abounding in contrast or variety of bright colors] < (Physical Object) v (Social Activity) > with

the head *ball* → Noun → (Physical Object)→ (Globular Shape)

to form the derived reading *colorful* + *ball* → (Physical Object) → (Globular Shape) → (Color) → [Abounding in contrast or variety of bright colors].

A selection restriction would prevent the amalgamation of the other reading of the modifier *colorful,* that of → Adjective → (Evaluative) → [Having distinctive character, vividness, or picturesqueness] < (Aesthetic Object) v (Social Activity) > with the reading of the head mentioned above, because the modifier *colorful* may be embedded readings for the head only if the reading of the latter has semantic markers either (Aesthetic Object) or (Social Activity) neither of which it has.

The P1 produce the semantically interpreted P-markers. In Katz and Postal's theory the concept of *semantically interpreted P-markers* is defined as »a set of pairs with respect to the P-markers, one member of which is a node of the P-marker and the other of which is a set of readings, each reading giving one of the meanings of the string dominated by that node in the P-marker.« (22)

Taking into consideration the distinction between the kernel sentences, i. e., the sentences having only *obligatory singulary transformations* in their T-markers, and the sentences having also at least one *optional singulary transformation* or at least one *generalized transformation,* originally the P1 are said to opereate on the final derived P-markers of kernel sentences.

It was concluded in the analysis that *many* of the sentences produced by the optional singulary transformations have the same meaning as the structures from which they were transformed, i. e., the optional singulary transformation did not change their meaning. These sentences are regarded as belonging to *equivalence classes of sentences.*

Therefore, if one member of these equivalence classes of sentences was provided a semantically interpreted P-marker a convention may be stated that »every member of such an equivalence class has the same semantically interpreted P-marker.« (23) The use of P1 for each member of the equivalence class is no more necessary.

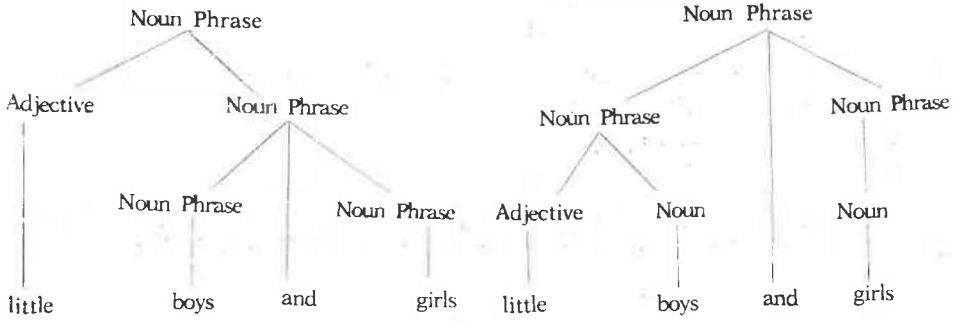
On the contrary, in cases in which optional singulary transformation or generalized transformation changed the meaning the use of P1 for each sentence is necessary.

The meaning being changed, the *Type 2 projection rules* (henceforth P2) are employed, as they are intended »to explicate the manner in which such transformation alter or build up meanings.« (23) In other words, having the P1 produced meaning of both constituents and phrase structure of the interpreted P-markers in the kernel sentence, the P2 derive semantically interpreted P-markers for a sentence that is transformed either by an optional singulary transformation or by a generalized one.

Let us now consider the notion of *semantic interpretation of a sentence* in Katz and Postal's theory. They start with already known statement that the same string of formatives may have two or more different SD in the syntax. Take for ex. the sentence

I like little boys and girls

that have two different P-markers representing Noun Phrase *little boys and girls,* as in the following tree diagram



Therefore Katz and Postal introduce the term *sentoid* to define a string of formatives that has a *unique associated SD* as opposed to the term *sentence,* a string of formatives that may have more than one SD. As one sentence may represent n sentoids, from their point of view the *semantic interpretation of a sentence is:*

1. »set of semantically interpreted P-markers such that each semantically interpreted P-marker represents one of the n ways in which S is syntactically ambiguous;

2. the set of statements about S that follow from this definition schema:

S is fully X if and only if S is X on every semantically interpreted P-marker in each sentoid which S represents.« (25)

At this stage it is necessary to emphasize what semantic properties of sentoid have to be marked by the semantic interpretation as well as over which semantic properties the variable X ranges.

The meaning of every constituent of the sentoid must be represented in such a manner so that it is explicit:

one, if it is *semantically ambiguous,* like the Noun Phrase *bank* and, consequently, the whole sentoid are in the sentence:

the bank is the scene of the crime

the *bank* being semantically ambiguous in at least three ways (= an establishment for monetary exchange; a steep acclivity or slope; the rising ground bordering a body of water);

two, if it is *semantically anomalous* like it is in the sentoid:
the paint is silent

in which the meaning of its constituents, when combined »do not yield a cognitively coherent meaning for the whole sentoid« (25); or if it is *semantically accepted,* as it is in the sentoid:

he paints silently

The semantic interpretation must mark clearly:
a) semantic relations between one sentoid other ones that, regardless of their different syntactic structure or morphemic constitution, are *paraphrases* of each other, as for ex. are the following sentoids:

eye-doctors eye blonds
ocuklists eye blonds
oculists eye blonds
blonds are eyed by eye-doctors
blonds are eyed by oculists

b) the cases when two or more sentoids are *inconsistent* with each other, as the following sentoid are:

blonds like redheads
blonds do not like redheads

c) such semantic properties that render the sentoid to be *analytic,* i. e. when it is »true by virtue of meaning alone« (26) like it is in:

spinsters are women

or *contradictory,* when it is »false by virtue of meaning alone« (26), as it is in:

spinsters are married

or *synthetic,* when, whether its being true ot false can not be proved by the meaning alone, but an additional empirical evidence is required to be so stated, like in:

spinsters are nice

The Projection Rules

One question still remains unanswered: on which P-markers in the set of all P-markers the P1 should operate in order to assign semantic interpretation to the sentoid? Namely, should it operate a) only on the underlying P-markers, b) only on the final derived P-markers, or c) on all of them?

Obviously, in case of first two alternatives P2 are to be applied on the remaining P-markers on which the P1 did not operate; in the third case no P2 are necessary at all.

In terms of the distinction of two types of transformations this question makes sense only in the case of transformations affecting meaning, namely in:

1) generalized transformations, and in

2) those singulary transformations that do alter the meaning (it means other than those with alternative word order, passive construction, etc. in which semantically interpreted P-markers of the kernel sentence are identical to those of the transformed one).

Semantic interpretation of structures derived solely by the singulary transformations

Katz and Postal propose that the P2 do not operate in the sentences whose T-markers have only obligatory transformations, because these can be fully semantically interpreted by the P1 alone. They further claim that the P1 operate only on the underlying P-markers, supporting their claim with that: ». . .fundamental grammatical relations like subject, object, predicate, etc., correlate only with the features of underlying P-markers,« (33) and independently of the facts that:

1. the underlying P-markers may be similar or identical while the derived P-markers are different;

2. the underlying P-markers are different while the derived P-markers are similar or identical, as in:

1. a. John drank the milk
   b. the milk was drunk by John
2. a. who hit someone
   b. who did someone hit

In both cases 1. a. and 1. b. *John* is the subject of the verb, and *milk* is its object; in 2. *who* is subject in 2. a. but object in 2. b.; *someone* is object in 2. a., but subject in 2. b.

The derived P-markers, then, do not »represent in a non-ad hoc way the relational equivalence« (34) of *who* in 2. a. and *someone* in 2. b. as subjects, and *who* in 2. b. and *someone* in 2. a. as objects.

This relational equivalence of the elements of the different sentoids as well as the grammatical relations between the elements of the same sentoid are represented syntactically only in the underlying P-markers.

Other convincing arguments are those contained in the examples like:

the picture was painted by the new student
the picture was painted by the new technique

in which *»by phrase«* once expresses the subject relation *of the new* student to the verb *paint* while in the other sentoid it is a modifier to the verb *paint,* and the actual subject is missing.

That the P1 should operate only on the underlying P-markers is particulary necessary in the three types of transformations that distort the underlying structure while deriving a new one. These are: *permutation* (and other orderchainging transformations), *deletion* and *adjunction or addition.*

a) *The order-changing transformation* denies the possibility of deriving grammatical relations from the final derived sentence, the final line of which may contain »interrupted lexical item« (40), not presented in that (interrupted) form in the dictionary, like in sentoid:

he looked the number up

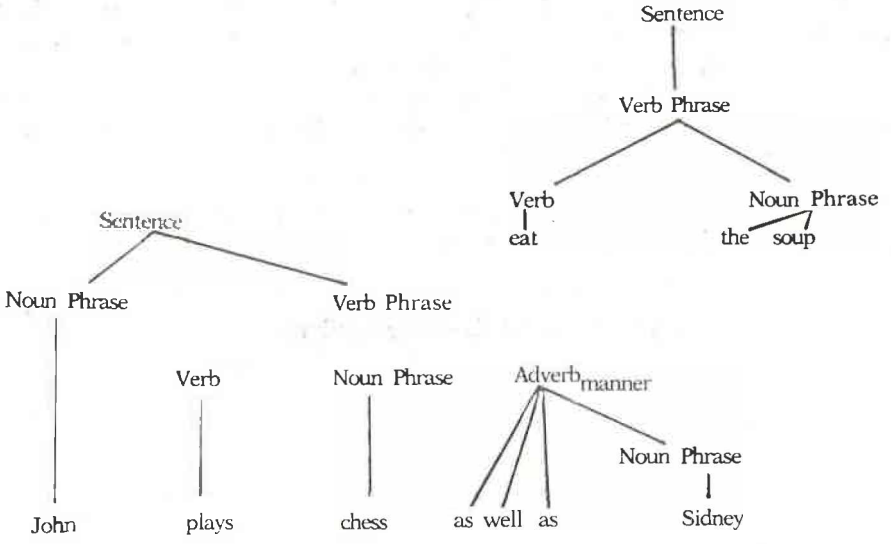
In order to treat these discontinuities the dictionary entry might provide either additional ad hoc readings or »a whole new type of projection rules for these cases of discontinuous items« (40) has to be formulated.

Being the sentence
he looked the number up
paraphrase of the sentence
he looked up the number

because they both have identical underlying P-markers with non-discontinuous lexical item, the solution might be, and in fact it is, that P1 assign a semantic interpretation to the second one and then be the same interpretation applied to its paraphrase with the discontinuous lexical item. In such way, both additional ad hoc readings for discontinuous items and introduction of new type of projection reles are avoided.

b) After this permutation or particle inversion transformation let us consider the *deletion* that proves once more why P1 must not operate on the derived P-markers. The next two sentences and their representation in a tree diagrams clearly and undoubtly show that if P1 had been applied on the derived P-markers no correct semantic interpretation could have been obtained:

1) eat the soup
2) John plays chess as well as Sidney



In the first sentence the second-person element is missing; in the second sentence no syntactic relation shows that Sidney is the subject of Verb Phrase *plays chess*. These relations are represented in their underlying sentence, for they provide syntactic information necessary for the correct semantic interpretation, as in:

1) you will eat the soup
2) John plays chess as well as Sidney plays chess

If we try to apply P1 to the derived P-markers and still want to obtain correct semantic interpretation there exists a possibility of adding some new projection rules such as:

1. »When the first element in a derived P-marker is an uninflected verb, this P-marker is to be treated semantically as if it had a second-person Noun Phrase subject and an auxiliary containing *will.*

2. When there is a derived P-marker of the form Noun Phrase$_1$ + Verb Phrase$_1$ + as + well + as + Noun Phrase$_2$ it is to be treated semantically as if it were of the form: Noun Phrase$_1$ + Verb Phrase$_1$ + well + as + Noun Phrase$_2$ + Verb Phrase$_1$)«. (44)

But it is obvious that such special rule for *every* deletion transformation in *every* natural language would enormously and unnecessary complicate the conceptual apparatus; besides, it would represent a forced (and methodologically unjustified) attempt to apply the P1 on derived P-markers and derive semantic interpretation from its structure by all means, by introducing additional projection rules.

The last type of distorting transformations -that of *adjunction* or *addition*- is achieved by adding meaningless elements to the derived sentence, as is added the element *does* in the example:

John does not go home

in which it contributes no meaning that had not arleady been assigned to it by the element *not.*

This transformation has increased the number of elements in the derived structure, but these, being meaningless, are not contained in the underlying P-markers.

All these arguments have shown not only that the P1 have to operate on underlying P-markers, but also that »P1 should apply *only* to underlying P-markers,« (45), and on *all* underlying P-markers, because the necessary information for the correct operation of P1 is contained in them.

Semantic interpretation of structures derived with generalized transformation

The simpliest was of providing semantic interpretation for the sentences with generalized transformations would be *to extend* to them the previous conclusions valid for the sentences with singulary transformations. Indeed, they are true for those sentences, which, before the application of generalized transformation, had undergone singulary transformatinos. Nevertheless, the requirement that the P1 operate on underlying P-markers has different implication for these two types of transformations.

The difference reside in the fact that the semantic interpretation of the sentence with singulary transformation *is* completely and uniquely determined by the application of P1, because it (that sentence) has only a *single underlying P-marker* »whose semantic interpretation can be taken as the semantic interpretation of the *sentence as a whole*« (47). For the sentence with generalized transformation this condition is necessary, but not sufficient, because it has *more than one underlying P-marker.* As stated before, each P-marker has to receive semantic inter-

pretation, but also the sentence as a whole has to be semantically interpreted.

At this stage P2 are required to »provide a means for combining the *separate* semantic interpretation of the set of underlying P-markers (. . .) into a single semantic interpretation for the sentence as a whole.«(47)

In the following pages Katz and Postal specify their conception of the operation of the generalized transformations: the type of embedding transformation is taken as representative of the generalized transformation. Their concepts develop Chomsky's earlier theory: embedding transformation operates on a pair of P-markers and produces a new, derived P-marker by embedding part of one into another. The P-marker which receives embedded part is referred to as the *Matrix P-marker,* that one which provides the embedded part to the Matrix P-marker is said to be *Constituent P-marker.*

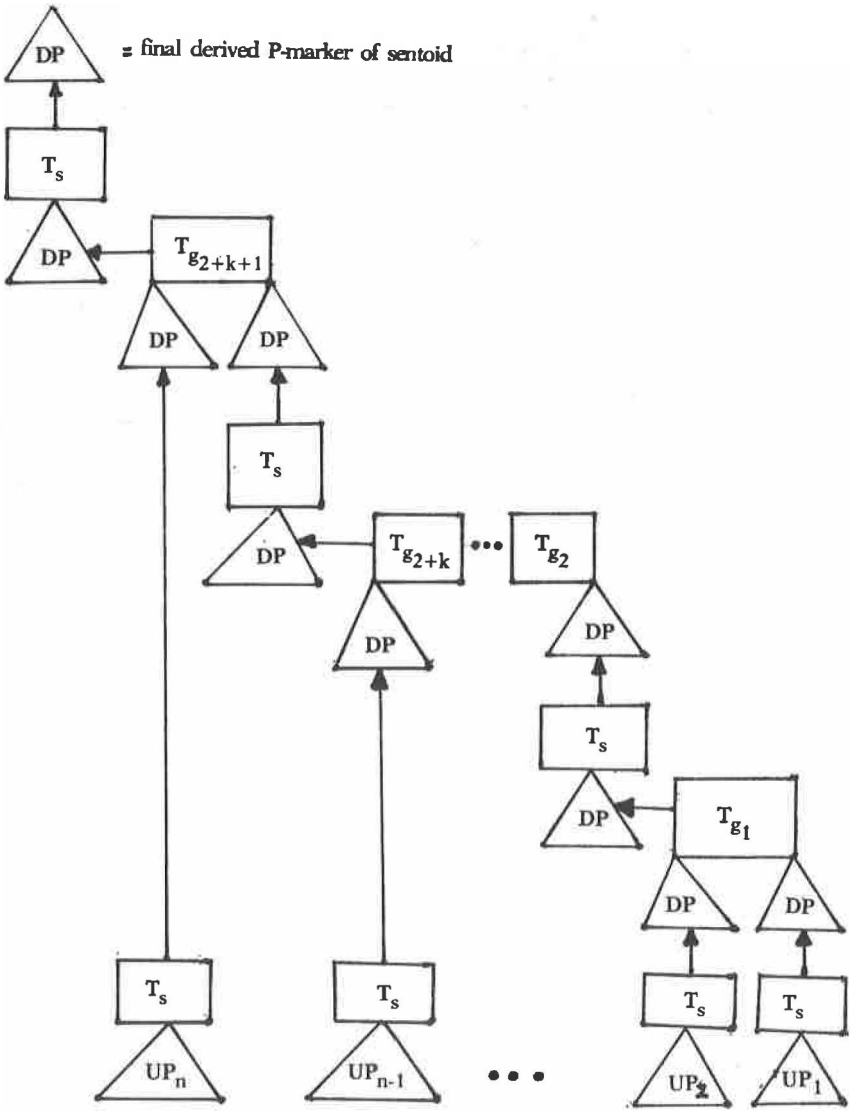
Katz and Postal extend this theory claiming that all Matrix P-markers are characterized by »the presence of one or more specified *dummy elements* in their last line,« (48), and argue that terminal string of underlying P-markers of all languages comprises these dummy elements (which, of course, have no reading), referred to as *Matrix dummies* (md henceforth). The embedding transformation then operates »by substituting the Constituent P-markers for some occurence of md.« (48)

They further specify that »all syntactic components contain among the nonterminal symbols of their phrase structure subpart a specified set of constituents, including at least two, called Relative (Rel) and Complement (Comp). Each of these constituents is developed into an occurence of md as its terminal representative.«(48) Elements Rel and Comp are, therefore, subparts of the constituents like Noun Phrase, Verb Phrase etc. In other words, Noun Phrase, Verb Phrase etc. also dominate, besides lexical heads such as Nouns, Verbs such elements like Rel and Comp.

As stated before, the function of embedding transformation is to substitute the constituent P-marker for the md representative of elements like Rel and Comp. At this point we have arrived to a new question: how do P2 provide semantic interpretation analogue to this syntactic procedure of combining Constituent P-marker with Matrix P-marker?

It is obvious that the procedure of providing semantic interpretation will not be as easy as it was in syntactic combining and also that it will not consist in simple association of semantic interpretation of the Constituent P-marker with the semantic interpretation of the Matrix P-marker. This is so primarily because the P-markers which form the basis for embedding transformation need not themselves be underlying P-markers, but may result from the other previous transformations.

The next diagram will illustrate the way in which P2 must operate. *Triangles* represent P-markers, the symbols *UP* and *DP* inscribed in them stand for respectively underlying and derived P-markers. *Rectangles* represent transformations, symbols T_s and T_g mean respectively singulary and generalized transformation. For the sake of simplicity it will be assumed that each P-marker contain only one occurence of md, except the UP_1, which will contain no md.



It clearly demonstrates:

1) that a sentoid (= final derived P-marker of sentoid, at the diagram) may have more than one underlying P-marker;

2) that it may result from several embedding transformations of P-markers in each other;

3) that each pair of underlying P-markers »may undergo a finite set of singulary transformations to yield a pair of new derived P-markers. This pair may then undergo a generalized transformation which embeds one in the other to derive a single new derived P-marker,« (50) and again this one may undergo other singulary transformation, and that one derived may be applied some generalized transformation etc. etc. etc.

The operation of Pl is following:

They operate on *every* underlying P-marker in SD. As Up_1 does not contain md element(s) it will be *fully* interpreted by Pl. But the other UP will not. As they contain md elements (which have no reading, as mentioned before) every time Pl »try« to derive a new reading by combining some reading with that of a md, their operation will be blocked and Pl will provide only *partial semantic interpretation.*

At this stage — when the operation of Pl is blocked — the P2 are required. »(. . .) the task of the P2 can be characterized as that of providing a set of derived readings for the constituent that immediately dominates the occurence of md in UP_2 on the basis of the readings assigned by Pl to UP_1. In other words, the semantic analogue of the syntactic process of embedding is (. . .) the association of the readings from the underlying P-markers which are the basis for the Constituent P-marker of the embedding with a constituent in the underlying P-marker which is the basis for the Matrix P-marker of the embedding.« (52)

The P2 will combine full semantic interpretation of UP_1 with that constituent in UP_2 which dominates immediately md element; therefore in the positions where earlier md occurred now readings have been inserted and the operation of Pl is no longer blocked in that determined P-marker. The process of unblocking then proceeds, embedding by embedding, making P1 applicable to each P-marker.

So far, a very important point has been omitted on purpose: that of ordering. Obviously the order in which P-markers are combined and embedded is of some importance.

Consider the next two sentoids containing the same set of underlying P-markers whose difference resides in the order the P-markers have been successively embedded:

1) I know that the boy who John likes hates Mary
2) the boy who I know that John likes hates Mary

Consider now diagrams representing their P-markers:

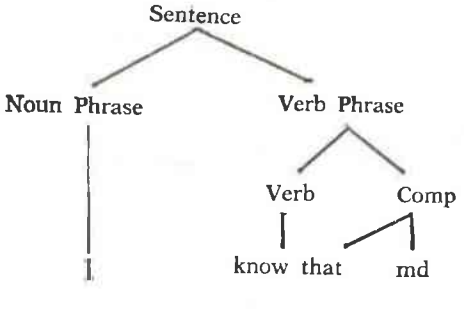


Diagram No.1

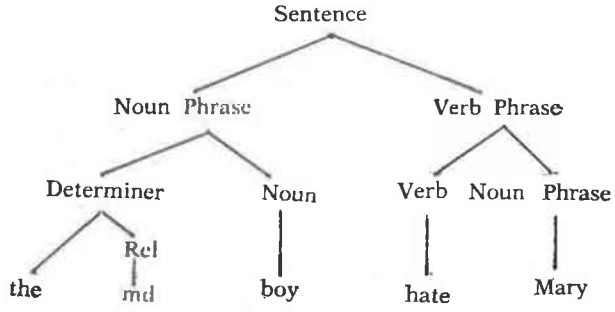
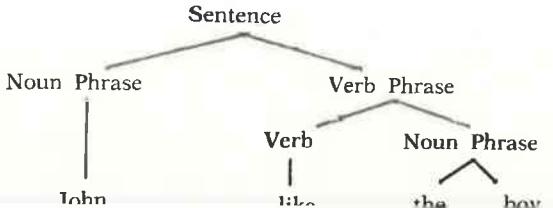


Diagram No.2

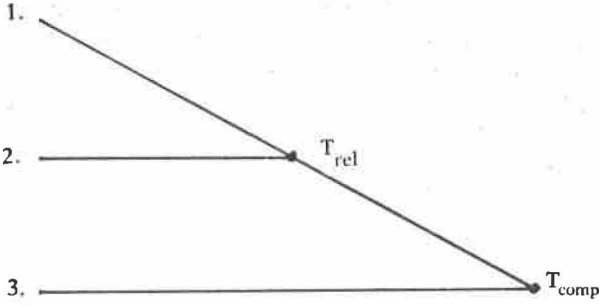
Diagram No.3



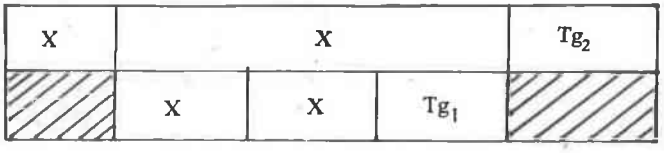
Obviously, the first sentence results after the P-marker in the diagram No. 3 has been embedded in that of the diagram No. 2 and the result in that of the diagram No. 1.

On the contrary the second sentence is the result of embedding the P-marker from the diagram No. 3 into that of the diagram No. 1 and their result in that of the diagram No. 2.

That is why Katz and Postal suggest that SD generated by syntactic component should specify »the order in which transformational operations on underlying and derived P-markers occur« (55) in complex sentoids which contain several applications of generalized transformations. T-marker, — a subpart of SD —, is available to perform this task and indicate the order of successive embeddings. Katz and Postal propose the following representation of this procedure: »Succession of an underlying P-marker and a transformation will be interpreted to mean the application of *that transformation* to that P-marker,« (56) as shown in the next diagram, in which the numbers 1. 2. 3. stand respectively for P-markers in the previous diagrams No. 1., No. 2. and No. 3.

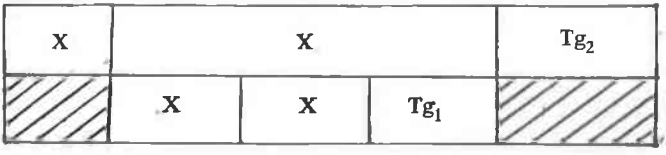


The same procedure may be represented in some other way, too, namely in the following diagram in which the substrings that underlie the Matrix P-markers are to the left of those which underlie the Constituent P-markers. Both are to the left of the generalized transformations.



$$\text{No.1} + \text{No.2} + \text{No.3} + T_{rel} + T_{comp}$$

This first diagram illustrates that the first sentence is formed by embedding P-marker from the diagram No. 3 into the P-marker in diagram No. 2 by T_{rel} and the result is embedded into P-marker from the diagram No. 1 by T_{comp}.



This second diagram shows that the second sentence results from the embedding of the P-marker from the diagram No. 3 into P-marker of the diagram No. 1 by T_{comp} and from the embedding of the result of it into P-marker of the diagram No. 2 by T_{rel}.

In such linearized representation T-markers illustrate the order of successive embeddings and show that the difference between the two previous sentences lies in the different ordering of T-markers.

At this point one should ask *where* the Constituent P-marker is to be embedded. The authors specify these two conditions which have to be met in order to answer this question:

»1) In an embedding, the Constituent P-marker is inserted at the point of the *leftmost* occurrence of md in Matrix P-marker;

2) If any P-marker contains an occurrence of md it can not, for this reason, be the Constituent P-marker of an embedding.« (60)

The first condition clearly illustrates the ordering of the substitution of md; the second one guarantees that no P-marker can be embedded unless the occurrence of md contained in it is removed.

In the last but one chapter *Apparent Counterexamples* (pp. 71—157) Katz and Postal deal with possible counterexamples to their conception of semantic component in the sentences both with singulary and generalized transformations.

The last chapter *Conclusion* (pp. 152—172) is dedicated to the substantive and formal universals of language.

Snježana Smodlaka: KATZ-POSTALOVA INTEGRALNA TEORIJA DESKRIPTIVNE LINGVISTIKE

Sažetak

J. J. Katz i J. A. Fodor su 1963. u *The Structure of a Semantic Theory* potakli semantičke studije i predložili da se semantika razmatra kao integralni dio generativne gramatike. Sljedeće godine su J. J. Katz i P. M. Postal u *An Integrated Theory of Linguistic Description* pokušali integrirati Chomskijeve generativne koncepcije fonologije i sintakse sa semantikom; nastojali su također da iznađu adekvatne postupke kojima bi inkorporirali gramatičke i semantičke opise jezika u jedan sveobuhvatni opis.

Od triju komponenti svakog jezičnog opisa *sintaktička komponenta* predstavlja generativni izvor; ona generira *apstraktne formalne strukture* koje stoje u osnovi određene rečenice; *semantička* i *fonološka komponenta* operiraju na sintaktičkom izlazu *(output)*, izvode neovisne operacije na sintaktičkim strukturama i generiraju *semantičku interpretaciju*, odnosno *fonološki prikaz* za svaku od formalnih struktura koje je generirala sintaktička komponenta.

Sintaktička komponenta je sastavljena od *sistema pravila* koji navodi beskonačni niz apstraktnih formalnih struktura; ta pravila pripisuju jedan ili više strukturalnih opisa svakom jezičnom znaku.

Semantička komponenta se sastoji od *rječnika* koji sadrži značenja svakog leksema u jeziku, i konačnog niza *projekcionih pravila*. Jezični znak u rečenici dobiva značenje iz rječnika; projekciona pravila semantički interpretiraju svaki element posebno, a zatim kombiniraju značenja svih elemenata *prema* sintaktičkom opisu.

Ovaj napis iznosi detaljno postupke Katz-Postalove teorije