

The Models of Transformational Generative Grammar Represent Different Stages in the Construction of One Theory

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Introduction:

Chomsky established the notion of generative grammar in his syntactic structures 1957. In 1965 the standard theory made a distinction between deep structure and surface and it introduced the semantic components.

The supporters of transformational generative grammar (TGG) believe that native speakers have the ability to produce an infinite number of well-formed sentences. A native speaker has an innate capacity to produce well-formed sentences, which are the main concern of linguists since they do not study sentences that have been studied before.

Transformationalists believe that all languages of the world share common features in deep structures. They try to find universal grammar, that is a theory of equal notations, which have equal principles to all languages.

Chomsky's grammar has been liable to many revisions and modifications since 1957 up to the recent time by Chomsky himself and by linguists all over the world. New concepts concerning the literature are always added and some other ones are ruled out.

This paper will shed light on the models of TGG to point out that they just represent different stages in the construction of one theory and no model should be taken as a final one. Since the topic is very huge; it is difficult to follow in detail all the revisions and modifications in the transformational models of Chomsky's grammar within the present study. However, the researcher will give many examples concerning the discussion of each model and special emphasis will be devoted to the Revised Extended Standard Theory (REST) and Government and Binding Theory.

Chomsky's Early Theory (Syntactic Structures)

'Syntactic Structures' represents a departure from the structuralist emphasis on external, observable data. This book is the early version of transformational grammar. In this work Chomsky also departed from the structuralists in seeking rules that underlie all languages, i.e. universal grammar. He claims that there are "linguistic universals in the domain of syntax" (Sampson, 1980:131). He (ibid., 140) believe "that there might be an empirical, falsifiable, scientific theory of syntactic naturalness".

As defined by Chomsky (1957:11) "Syntax is the study of the principles and processes by which sentences are constructed in particular languages". To him grammar means "a device that generates all the grammatical sequences of (a language) L and none of the ungrammatical ones" (ibid., 13)

This theory is frequently called ‘generative grammar’ because it seeks to set up a system that will generate part of the theory is involved in transforming basic sentence types into other types. However, what matters is the statement that all human languages can be generated by constituency grammar (Herndon 1970:21; Samson, 1980:164)

In his syntactic Structures, Chomsky defines a grammatical transformation as a rule. A transformational rule is a rule that “operates on a hierarchical structure assigned to a morpheme sequence by a constituency grammar, and alters it into a new hierarchical structure in a way which modifies the string of morpheme-acting as leaves, of the tree” (ibid., 140-1). One of the most important features of the transformational rules in Syntactic Structure is their heterogeneity as stated by Lyons (1968:260).

According to Chomsky (1957:107) grammar can be considered as a (tripartite grammar structure with:

1. a sequence of rules from which phrase structure can be reconstructed
2. a sequence of morphemic rules that convert strings of morphemes into strings of phonemes and connecting these sequences, and
3. a sequence of transformational rules that carry strings with phrase structure into new strings to which the morphemic rules can apply.

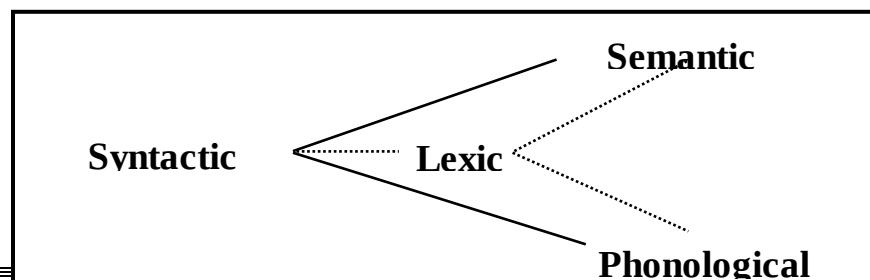
According to Chomsky’s Syntactic Structure, the notions of phrase structure are adequate for a small part of the language and that the rest of the language can be derived by repeated application of a rather simple set of transformations to the strings given by the phrase structure grammar. (Lyons, 1968:255).

The transformational generative theory of language can concentrate mainly on syntax rather than on semantics. Weber (2000:8) states that formal languages are considered syntactic languages and “their syntax is completely atonomous from semantic representation”. As Owen (1974:21) puts it “the early theory was concerned more with form than with meaning”. As regards phonology, it does not receive much attention in this theory; the morphemic component represents the morphemes and their pronunciation after the application of the transformational rules.

3- The Standard Theory

Standard theory is a term, which refers to the model of generative grammar proposed by Chomsky in his 1965 book, Aspects of the Theory of Syntax.

This theory proposes that the description should consist of three components and a lexicon related as clarified in the figure below. (Chomsky, 1965; Brown, 1980).



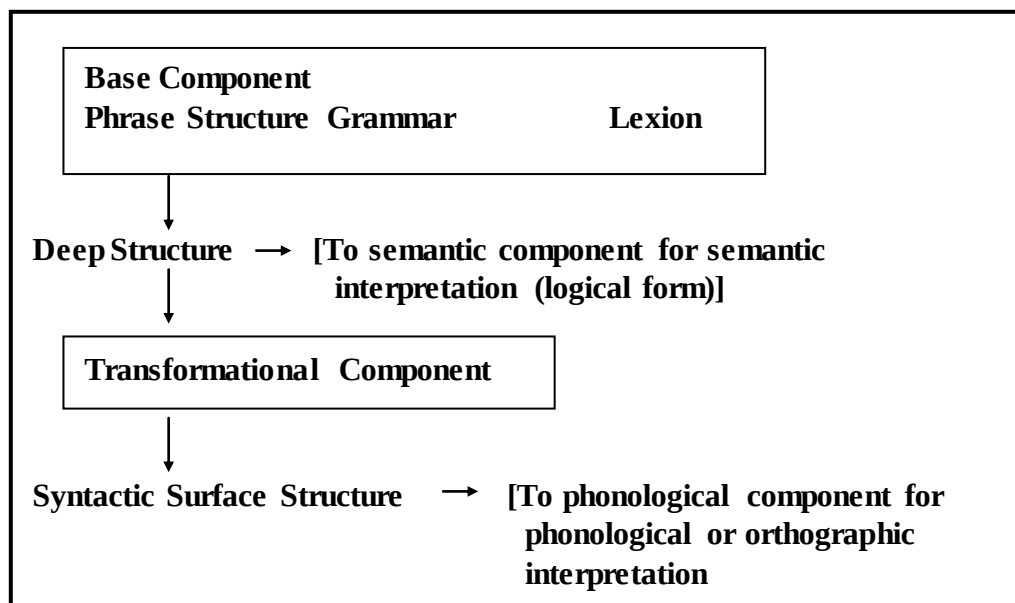
The syntactic component is regarded to be the core of the system as the directionality of the arrows linking the three components indicates. Each component has access to the lexicon as the dotted lines in the above figure indicates.

The most important feature of the standard theory was its postulation of a level of deep syntactic structure with certain characteristics that give it a unique place in the explanation of grammatical phenomena. At this level, the entities, are the input both to the semantic component and the syntactic transformations. Such properties make the structure a unique level that determines the semantic interpretations of sentences and their phonological interpretation.

The syntactic component specifies, for each sentence, a deep structure that determines its semantic interpretation and surface structure which determines its phonetic interpretation.

According to the Standard Theory all meaning is fully represented in the deep structure since the selection of words occurs before transformation takes place. (Bever et al. 1977:3; Bornstein, 1977:24)

To identify the relationship between the components of the Standard Theory, let us notice the following figure.



The syntactic component comprises a set of base rules and transformational rules. The base consists of a set of phrase structure rules, which has access to the lexicon to insert lexical items into the structures generated by the base component.

The output we get from the base component is a lexicalized phrase marker. (ibid. 137).

The deep structure acts as the essential bridge between the syntax and the semantics. It is made available to the semantic component for semantic interpretation and at the same time it is the input to the transformational component.

Chomsky (1965) criticizing his Syntactic Structure states that deep structures have the ability to remove ambiguity in structures. Notice the following example.

3. Flying planes can be dangerous.

In (3) above the word “planes” can be the subject of the verb “fly” or “are flying” or it may be the object of “fly”. The sentence has two different interpretations as clarified in (4) and (5) below.

4. Planes fly (are flying).

5. We fly planes.

Similarly:

6. Love of god is needed.

is related to two sentences in English as shown in (7) and (8)

7. God loves mankind.

8. Mankind love God.

The transformational component accounts for surface forms but is also mainly responsible for accounting for structural relatedness between sentences. This component consists of a set of transformational rules, which can add, delete or move constituents. It needs access to the lexicon to be sure that transformations are not inappropriately applied to trees to have certain lexical items. Each rule operates on an input structure and produces a derived structure (op cit).

In this theory, transformational rules have been formalized and each rule consists of two parts, namely, structural description (SD) which is instruction to analyze a phrase marker into a sequence of constituents and structural change (SC) which is an instruction to modify the structural description. To clarify the formalism used, let us consider the particle Movement Transformation:

(9)

SD: X---- Verb - Particle - NP - Y

1 - 2 - 3 - 4 - 5 →

SC: 1 - 2 - 0 - 3+4 - 5

If we apply this rule to the sentence (10)

10- Mary will stand up her date

Mary will	stand	up	her date	
X	v	Particular	NP	Y
1	2	3	4	5

We get (11)

11- Mary will stand her date up.

Mary will	stand	0	her date	
(X)	2		3+4	5y

(Akmajian et al, 1979:169)

The transformations, as mentioned by Bever et al. (1977:2) are applied “as a whole cyclically, form the most deeply embedded structures to the root of each structure, and within each cycle they apply in

sequence, independent of each other.” The final derived structure after the operation of all transformations is the syntactic surface structure. Surface structures are mapped into phonetic representation, by the phonological rules. Thus one may speak of phonology “as being a re-encoding component providing an interface between the surface structure generated by syntax and the speech production mechanism which links to the external world.” (Morton; 1995).

The semantic component consists of two parts, a dictionary which is responsible for providing a meaning for the lexical items of language and a finite set of projection rules. In the semantic component, the entities of the dictionary must be in a normal form (Dinneen, 1967:391). The semantic component operates on the syntactic deep structure in order to produce a representation of specific aspects of the meaning of the sentence.

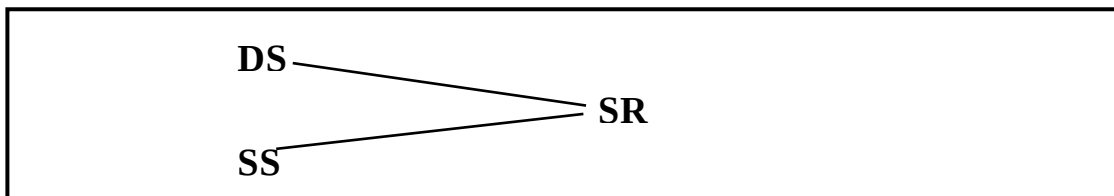
Two important points are made about semantic representations. The first is that the sorts of meaning that can be accounted for will be limited. The second is that transformations will not affect meanings. All meaning-bearing elements will be present in the deep structure.

4- The Extended Standard Theory

The Extended Standard Theory (henceforth EST) proposes some revisions in order to solve certain inadequacies in the Standard Theory. Certain linguistic phenomena were difficult to account for within the framework of the Standard Theory like “quantifier relations”, the interaction of quantifiers and negation, topic-comment relations as in active/passive pairs, focus and presupposition and certain apparent constraints on the operation of transformational rules”. (Bever et al. 1976:4).

As regards semantic interpretation, this theory claims that semantic representation is determined jointly by the deep structure and surface structure with the qualifications concerning surface structure. Deep structure determines grammatical relations, surface structure determines some aspects of semantic interpretation such as focus and presupposition; deep and surface structures determine other aspects of semantic interpretation such as coreference. The following figure clarifies the way the semantic representation (SR) is determined according to EST.

(12)



As shown above, the supporters of the EST try to find answers to the relationship of surface and deep structures and their function in changing or preserving meaning. The EST has a different base component from that found in the Standard Theory base-syntactic and

semantic level, should not be mixed together if we adopt the structural position. (Grinder and Egin : 1973).

Chomsky and a number of his students and colleagues argue that the standard theory's restriction against semantic rules applying anywhere but at the level of deep structure was inadequate because "linguistic facts could be described in grammars that allowed semantic interpretation rules to apply to both underlying and superficial phrase markers." (op cit). They denied the Katz-Postal thesis that syntactic transformations make no contribution to the meaning of the sentence by stating that certain aspects of semantic interpretation occur at the level of surface syntax. The theory of grammar, as Chomsky and others claimed, should contain universals for surface interpretive rules in the semantic component. (ibid. 5) Features of surface structure relevant to the semantics include various functions of stress and intonation, aspects of quantification and the focus in a sentence which gives information concerning the sentence's presupposition.

The EST, like the Standard Theory, represents Interpretive Semantic Theory which believes in meaning preserving. These transformational rules can make use of the structure of contiguous phrase markers in a derivation, therefore, they are significantly more powerful.

As stated by Chomsky (1972:136), generative semantics converges with EST in most respects.

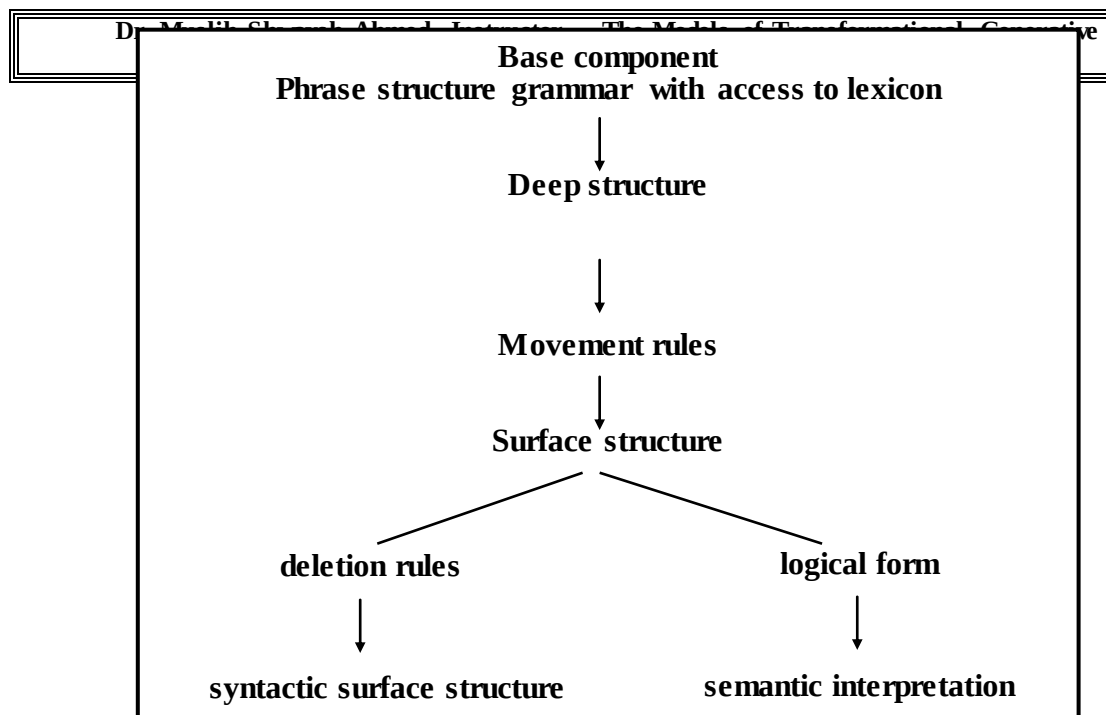
He (ibid.) adds that "there are a few differences which are either terminological, or lie in an area where both theories are comparably inexplicit."

They are descriptively equivalent, but generative is a less restricted form of EST. However, generative semanticists like McCawley and Postal argued that "Generative Semantics is to be preferred over EST because of making use of a more limited inventory of rule types. (Wasow, 1977:327)

5- The Revised Extended Standard Theory

The Revised Extended Standard Theory (henceforth, REST) was proposed by Chomsky in 1975, "Following the adoption of the trace convention on the application of Movement Rules." In this theory, all semantic interpretation occurs at the level of surface structure. This means that Chomsky further reduces the content of the initial phrase marker (deep structure) and increases the rule of the surface structure "I will further, suggest that perhaps all semantic information is determined by somewhat enriched notion of surface structure ... We can tentatively postulate that only surface structures undergo semantic interpretation". (Chomsky, 1975 :116).

The descriptive power of the grammar in the REST is no longer, as in Standard Theory, concentrated in the transformational component of the syntax, but is distributed among a variety of components. To clarify the relation between the components, let us consider the following figure.



The base component of this version incorporates the lexical hypothesis and the X-bar convention, i.e., the phrase structure grammar. The general principles that govern the phrase structure grammar do not differ except in being enriched by taking “explicit account of dependency relations between constituents”. (ibid)

The lexicon accounts for certain kinds of basic and derived syntactic environments and it includes a set of principles which will determine how functional relations are assigned to the various arguments of a verb. (ibid)

The transformational component containing the movement rules is vastly restricted in scope. In fact, the REST model has abandoned all but a few transformations. The two kinds of rule that remain are movement and deletion rules, which are separated into distinct components according to Chomsky’s proposal. The movement rules are few in number and highly constrained and this involves the exact constituents they can move and where they can move. Since movement rules neither create nor destroy structures, they are structure preserving and moved items leave traces behind in the original places. Bach (1977:142) mentions that a “trace is simply an indexed non-terminal node with no lexical content”. The trace theory of movement rule states that “when a transformation moves a phrase P from position X to position Y it leaves in position X a trace bound by P”. (Chomsky, 1975:95). Although trace is phonologically null, it affects a semantic rule as strongly as an expressed subject. To clarify, let us adopt Chomsky’s (ibid) example.

14. Y seems [s John to be a nice fellow]

15. John seems [s t to be a nice fellow]

In the examples above, the grammatical relation of “John” as subject of the embedded sentence is determined by the position of the bound trace in surface structure. After the application of movement rules we get surface structure as an output. In the REST the movement usually precedes, the deletion component.

5-1 The Notion of Surface Structure in REST

Chomsky and his followers gave, as stated before, the thesis that surface structure is only level that undergoes semantic interpretation. They gave examples which prove this claim. Fiengo (1980:18) mentions that the reciprocal pronoun 'each other' is a clear example which leads to the conclusion that at least some of the information necessary to semantic interpretation should be derived from surface structure.

Let us consider the following example. (ibid)

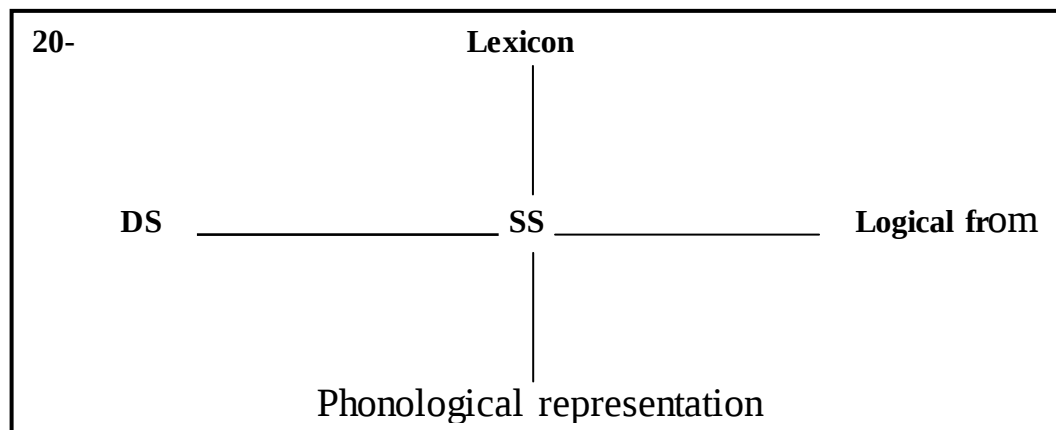
16. Δ seems to each other [the men to love the women]

17. Δ seems to each other [the men to be loved the women by Δ]

18. the men seem to each other to love the women.

19. the women seem to each other to be loved by the men.

The sentences (18) and (19) appear to express quite different propositions though they have some semantic similarities. "These differences are the result of an anaphora rule whose simple formulation requires application at surface structure" and this "indicates the motivation for the claim that surface structure contributes to semantic interpretation directly" (ibid). REST allows derivations of the following from in which we have four rule systems each of which relates to level of surface structure.



The surface structure provides the input to the semantic rules (as opposed to the deep structure of Standard Theory). That is why "it is necessary to enrich the surface structure so that it can represent all of the syntactic structure necessary to predict semantic properties and relations". (Bever et al. 1976:5).

5-1-1 The Types of Operation that Surface Structures Receive

Surface structures are open to two different types of operation, they are semantic interpretation and deletion component. The first occurs before string enters the deletion component. The interpretation that surface structures receive is in terms of logical form and "subsequently perhaps of a fuller semantic representation." (Brown, 1980:189). The semantic interpretation assigned at this level is of a strictly limited nature. (ibid). After they receive the semantic interpretation, they go

through the deletion component which is governed by the principle of recoverability. Elgin (1979:54) states that “deletion rules have to be set up in such a way that the deletion is always recoverable, that is, so that one can always tell what has been deleted”. Recoverability is an important constraint on operation of this kind because semantic interpretation takes place first.

5-1-1-1 The Use of Filters to Check Well-formedness

The output resulting from the application of deletion rules will be checked for well-formedness by a set of filters to prevent the grammar over-generating. Filters are “devices that scan surface structure to ensure that they are in fact well-formed”. (Brown, 1980:168).

Let us consider the following example:

21. I think that Mary is coming to dinner.

The complementizer ‘that’ is optional. It can be deleted by applying a complementizer deletion rule, and in this case we get the grammatical sentence (22).

22. I think Mary is coming to dinner.

However, deletion of ‘that’ is obligatory in (23) below.

23. *Who do you suppose ‘that’ is coming for dinner?

24. Who do you suppose is coming for dinner?

(24) above is a well-formed sentence. In others it is obligatory not to delete ‘that’.

25. That Mary is coming to dinner is unfortunate.

26. * Mary is coming to dinner is unfortunate.

(26) above is not a well-formed sentence. The REST allows the complementizer deletion rule to operate freely and propose a set of filters to declare particular outputs illegal. Filters enable the transformations to be formulated as exceptionless.

If the transformation overgenerates ... the filters then subsequently declare any anomalous structure as being illegal. (ibid., 118-9).

This will lead to a syntactic surface structure which is ready to enter the phonological component for a phonological interpretation.

6- Government / Binding Theory

Government and Binding label have equally important in the theory. They are highly related to each other. As stated by Black (1999:2), Government and Binding theory believes that “universal grammar can be broken down into two main components: levels of representation and a system of constraints”. This theory pays much attention to the order of words and considers it an important part of the syntax. Hence, it “seeks to account for how and why different word orders come about within a particular language”. (ibid., 21). The concept of government refers to a certain syntactic relationship of high abstraction between a governor and element it governs. Binding is concerned with the relations of anaphors and pronominals to their antecedents.

6-1 Government Theory

To clarify the specific syntactic relationship between a governor and an element it governs, let us consider the following example:

27- Mary gave a letter to him.

A preposition such as 'to' in (27) governs a noun phrase like 'him' in the example. The items that are used as governors include many lexical categories such as nouns, verbs, adjectives, and prepositions. Traditional grammarians state that nouns are usually governed by verbs and prepositions (Cook, 1988:35). In most constructions, a certain constituent can be regarded to be the head and other dependants of the head. The head governs its dependants and marks government in different ways. To illustrate, let us consider the following sentence in which noun phrases are with the categorial structure [Det (Adj.) N (PP)]

28. The large cat ate the rat.

29. The cat on the mat is mine.

The noun 'cat' is the 'head' and the determiner, adjective and preposition phrase its modifiers which are dependant on and governed by the head. (Brown, 1980:203). The relationship between two elements in a sentence leads to mutual influence between them.

In the light of the traditional grammar the subject of the sentence is used to govern the verb.

However, there are properties in a sentence that cannot be assigned to a single word but they dominate different locations particularly tense and number. Properties like these are represented by INFL (inflection) which has no existence in the surface structure or the lexicon. In Chomsky's viewpoint, tense refers to both past or present and must be detached from the verb and becomes part on INFL ... D. The surface structures reveal tense as being isolated from the actual verb as in the example below:

30- Smith past play tennis.

31- Smith present play tennis - (op cit. 36)

Within the framework of government / binding theory another abstract feature is viewed and denoted by the features of agreement (AGR) to point out whether the relationship that holds between a noun and the verb denotes a singular or plural agreement. Brackets are used in the two surface structures to link the verb and number. Consider the following.

32- The boys (plural fall) on the ground.

33- The boy (singular fall) on the ground.

Tense and AGR constitute part of the inflect element (INFL). As a result, tense and number can be used in one-lexical constituent (INFL). According to the theory, the AGR and INFL govern the verb and assign tense and number. (ibid).

Radford (1981:326), trying to modify Chomsky's treatment of government, puts the following rule.

34- NP is assigned case - feature [+ NOMINATIVE] if governed by TENSE.

In the above rule, the nominative case is viewed in terms of government to assign case marking, the same thing is said about the objective case.

The objective case in English is used to mark the object of a transitive verb and the object of a preposition as clarified in the rule below.

35- NP is assigned case-feature [+ OBJECTIVE] if governed by a transitive verb.

Unlike Chomsky, Radford (ibid.) gives a different idea since he believes that the govern relation should have a key role in the assignment of genitive case relation to noun phrase in English besides the nominative and accusative assignment. Regarding Chomsky's treatment, he proposes the following case role:

36- NP is assigned case-feature if governed by poss.

Depending on the rule given above, case markings can be handled in English through government terms.

6-2 Binding Theory

Binding Theory, as mentioned by Cook (1988:34), "is concerned with connections among noun phrases that have to do with such semantic properties as dependence of reference including the connection between a pronoun and its antecedent".

To illustrate, let us consider the following example:

37- Mary saw her.

38- Mary saw herself.

To account for the relationship between the pronominal 'her' and the anaphor 'herself', certain semantic implications should be taken into consideration. There are relationships between 'Mary' and 'her' which prevent them from referring on the same entity.

It is obvious that 'herself' refers to Mary in (38).

Knowing the syntactic relationship that holds between 'Mary', 'herself' and 'her' is a problem where knowing Mary's identity is not a problem.

This means that the internal structure of the sentence is essential. This theory can also account for the various semantic interpretations to point out when two expressions may refer to the same person and when they may not (ibid).

Reference is a relation that holds between an expression and entity, a symbol of the language and the objects and situation in the outside world (Lyons, 1982:168). Reference is related to the context of an utterance as mentioned by Lyons (ibid.). Reference is decided by the inherent meaning and the utterance. If we take the expression 'the cat' we say that it can be used to refer to a particular cat as its referent. The same expression may be used to refer to different 'cats'.

Anaphoric reference presupposes an earlier mention of a particular linguistic item. Anaphoric reference is a "term used in grammatical description for the process of result of a linguistic UNIT referring to some previously expressed unit or meaning, anaphoric reference is one way of marking the identity between what is being expressed and what has already been expressed"(Crystal, 1985:17)

On the other hand, anaphors must have antecedents within their own sentence. (Cook, 1988:46). Let us consider the following:

39- Jane said (that Susan, shot herself).

It is clear that the anaphor 'herself' refers to 'Susan', the subject of the embedded sentence and not to 'Jane' the subject of the main sentence,

and not to anyone else. Accordingly, it is said to be bound to the embedded noun.

Concerning ambiguity in pronouns, it is likely to take place because they either have an antecedent within the boundary of another sentence or refer outside it. Because of this relationship, pronominals are free outside their reference, (ibid.45).

7- Conclusions

The investigation carried out reveals the following results.

1. The models of TGG are not different theories, but rather different stages in the construction of one theory.
2. Although different models of TGG are presented, no model should be taken as a final one.
3. TGG has been always liable to modifications and revisions of its rules as clarified in its models. Below are the most important points.
 - a. The Standard Theory introduced the notions deep structure and surface structure and it is considered as a revolution against Chomsky's earlier work 1957.
 - b. The surface structure gets more emphasis in EST since it functions as the input to the semantic component.
 - c. In the REST, the deep structure has no relationship with the semantic component.
 - d. The constraints, filters and others are still needed to control even the limited number of transformations which remain in REST model.
4. The main cause behind having different models which belong to the same theory is the issue of the relationship between syntax and semantics which remains a matter of dispute among transformationalists.

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