Chapter 16

Transformational Generative Grammar
The Standard Theory II

1. *Introduction*
    There are some problems which arise in the implementation of the notions of TGG, and the solution of these problems change the appearance of the theory, sometimes creating new problems, which in their turn demand solution (sometimes creating new problems ...). One of these problems concerns the application of transformational rules.

2. *Rule ordering*
    Consider the sentences:

    (1)   John believes that Sara healed herself.
    (2)   John believes Sara to have healed herself.

The two are taken to be paraphrases, to have the same semantic interpretation, and therefore to share a deep structure. The description of the relation between these two sentences is described by means of a transformational rule of *rais-*
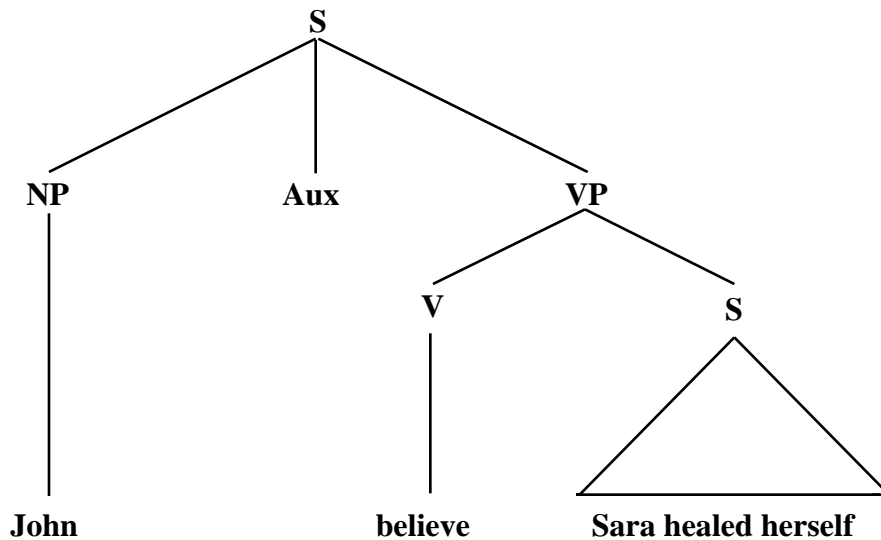

Figure 1: *Before raising.*

ing which operates upon their common deep structure represented in (1) to produce the derived structure which underlies (2). Cf. Figures 1 and 2. The transformational rule which derives the structure of Figure 2 can be stated as:

Raising   X [NP VP ...]$_S$ Y => X NP [Ø VP...]$_S$ Y

The presence of *to* in (2) in place of the Tense we would expect from Aux is the product of *tree-pruning* (Ross 1969:299):

> An embedded node S is deleted unless it immediately dominates VP **and** [Emphasis mine, PWD] some other constituent.
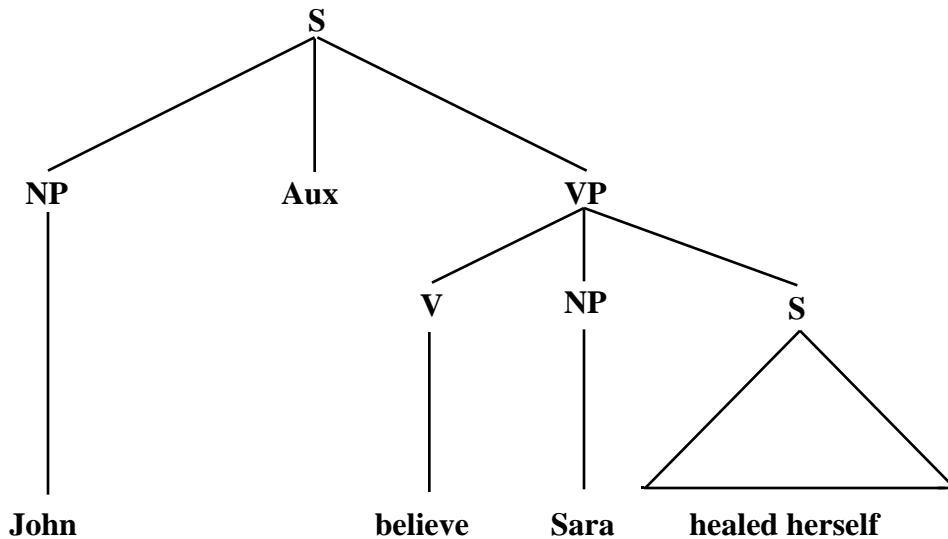
Figure 2: *After raising (before 'tree-pruning').*

Now let us add these sentences:

(3)   John believes that he has healed.
(4)   John believes himself to have healed.

Sentence (4) shows that *himself* falls within the same **S** as *John* because of the reflexive pronoun *himself* (Lees & Klima 1963); that is, if (3) and (4) are parallel to (1) and (2), then (4) demonstrates that the raising places the raised **NP** in the top most **S** in order to permit the reflexivization of *he* (or *John*) to *himself*. Comparison of (1) and (2) with (4) suggests this sequence:

(i)   Reflexivization
(ii)   Raising
(iii)   Reflexivization

Another pair of sentences has been used to suggest a rule of *Equi-NP Deletion:*

(5)   John wanted Frank to vote for me.
(6)   John wanted ＿＿＿ to vote for me.

Both these sentences have a structure similar to that of Figure 1. Cf. Figure 3. The Equi-NP Deletion rule takes this shape:

Equi-NP Deletion $[NP_1 [V[NP_1...]_S]_{VP}]_S => [NP_1 [V[Ø ...]_S]_{VP}]_S$

When the subject of the embedded **S** is coreferential with the subject of the matrix **S**, then the former is deleted. The effect is to produce an embedded **S**
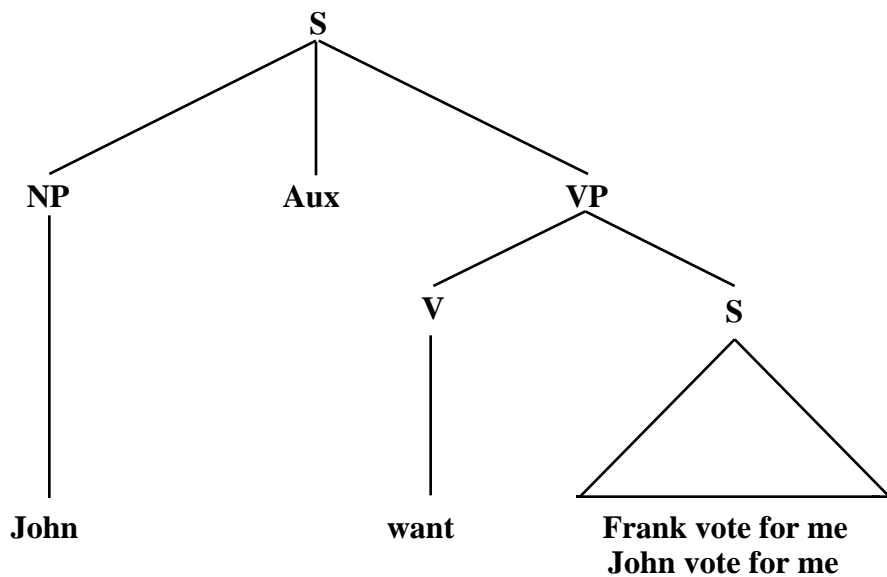

Figure 3: *A deep structure requiring Equi-NP deletion.*

like that in Figure 2. And Ross's tree-pruning operates again on the output of Equi-NP Deletion as it does on the output of Raising, hence, the non-finite *to*

vote.
   If we add the *Passive Rule* (after Fillmore 1963:228):[1]

Passive $\text{NP} + \text{Aux} + \begin{Bmatrix} \text{V}_{tr} \\ \text{V}_{tci} \end{Bmatrix} + \text{NP} + \text{X} \implies 4 + 2 + be + en + 3 + 5 \ (by + 1)$

                1   2   3   4   5

we can finally consider sentence (6):

(6)   John was believed by Mary to have wanted to defend himself.

With respect to the Deep Structure of Figure 4, our rules apply in the sequence
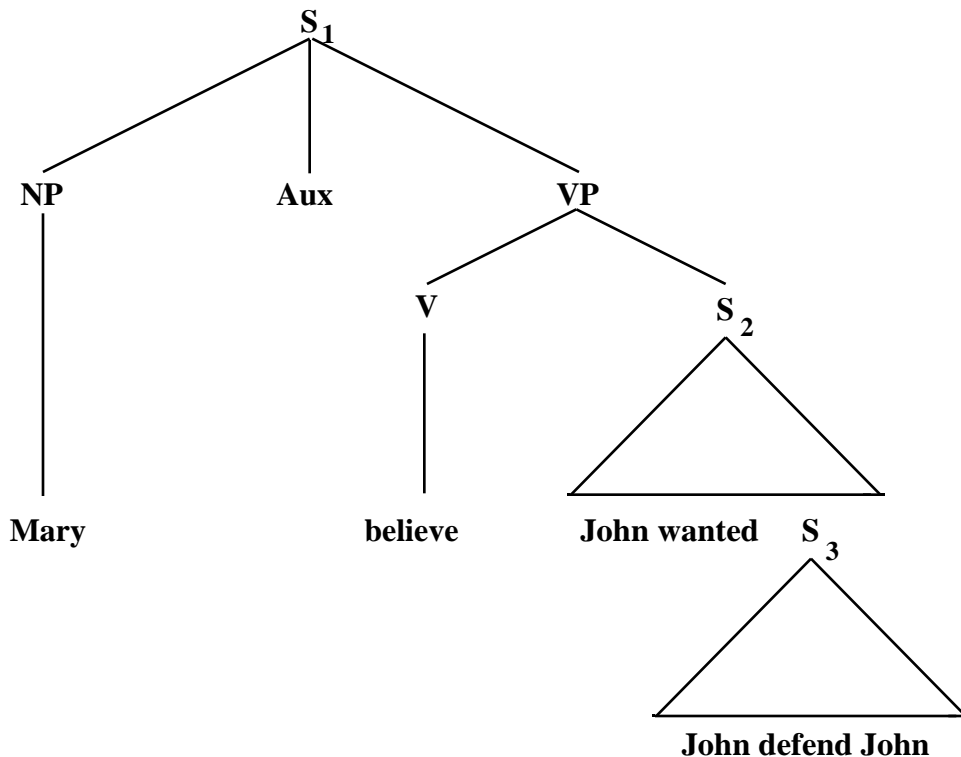
Reflexive - Equi - Raising - Passive

Figure 4: *A deep structure supporting Reflexive - Equi-NP - Raising - Passive.*

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[1] V_{tr} is a transitive verb, and V_{tci} is a transitive verb of the sub-class which includes *give*, *offer*, etc. (Fillmore 1963:225-26).

Reflexive has to convert the last *John* of S_3 into the pronoun *himself* **before** the **NP** governing the deletion is deleted by the Equi-NP Deletion rule; and the subject *John* in S_3, in turn, must be deleted **before** the *John* of S_2 is raised into S_1. There appears to be a *necessary order* to the application of these rules. If *John* is to be deleted from S_3, then reflexivization must be effected while the subject occurrence of *John* is still present. Otherwise, the structural description of the reflexive rule will not be met, or it will have to be complicated so that the raised **NP** can still act to reflexivize a coreferential item after it is raised out of its original **S**. Likewise, until Raising applies to S_2, the structural description of the Passive rule is not satisfied, and it cannot apply. The Equi-NP Deletion rule has the capacity to *bleed* the input of the Reflexive rule (i.e., to subtract from the number of structural descriptions satisfying the rule), as Raising rule has the capacity to *feed* the structural description of the Passive rule (i.e., to add to the number of structural descriptions satisfying the rule. Cf. Kiparsky 1969:196-200). In place of complicating a rule to meet the (unlimited ?) interactions which it may have with other rules, the more elegant solution appears to be to allow the **ordering**, especially since this sort of problem is not confined to this example.

3. *A paradox*
    If we now add sentence (7)

    (7)   John wanted to be seen by Mary returning the book

with the Deep Structure of Figure 5, then the rules apply in the sequence:

Raising - Passive - Equi

Raising *John* from S_3 causes it to appear as the direct object **NP** of *see* in S_2. The structural description for the Passive Rule is then met, and Passive may apply to exchange *John* and *Mary*. If the Passive rule is not invoked, the result will be (8):

    (8)   John wanted Mary to see him returning the book.

But now, if *John* is the passivized subject **NP** of S_2, the structural description of Equi-NP Deletion is met and that rule removes the second occurrence of

John (now the derived subject of S_2) to yield (7).[2]

Notice that (6) and (7) present us with another problem. The ordering of Equi-NP Deletion, Raising, and Passive appear to apply in that sequence:

Equi-NP Deletion – Raising – Passive

in the derivation of sentence (6); but in the derivation of (7), the sequence is
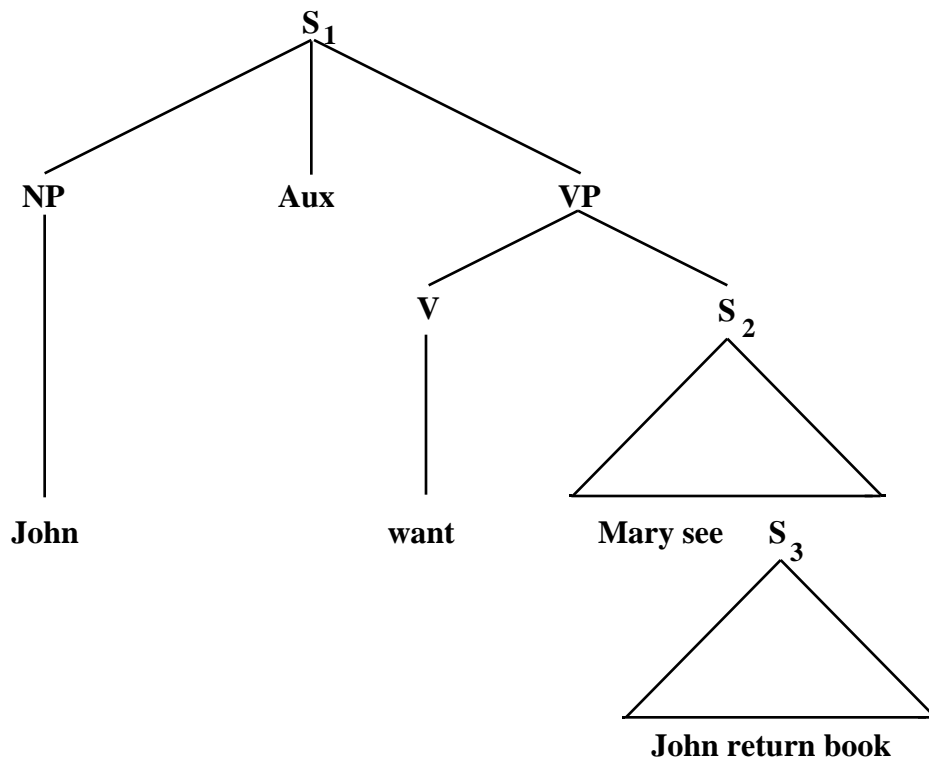
Raising – Passive – Equi-NP Deletion

Figure 5: *A deep structure allowing Raising - Passive - Equi-NP*

We have concluded that the transformational rules require application in an order, but now we find that the order in which they apply in different

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[2] Notice that the possible (?) *John wanted himself to be seen by Mary returning the book* seems to imply that Equi$_{NP}$ did not apply to [John seen by Mary]$_2$, thus yielding (7). Instead, Raising applied allowing Passive to apply in S_1.

derivations stands in conflict. There is an *ordering paradox*. How can a rule both precede and follow another without being entered twice in the grammar?

This problem is magnified in a sentence such as (9):

(9)   John was thought by everyone to want to be seen by Mary
        trying to return the book.

The Deep Structure of Figure 6 represents the syntax of this sentence. The rules we require to derive the Surface Structure of (9) are already known to us, but they must apply in this order:

$$\text{Equi}_5 - \text{Raising}_4 - \text{Passive}_3 - \text{Equi}_3 - \text{Raising}_2 - \text{Passive}_1$$

Equi-NP Deletion removes *John* from S_5 before *John* in S_4 (which triggers that deletion) is raised into S_3. And the presence of *John* is required in S_3 before that structure can be passivized; and S_3 must be passivized in order that Equi-NP can apply a second time to remove the passivized occurrence of *John*. And that must happen before *John* of S_2 disappears from that structure due to a second application of Raising, finally to allow the passivization of S_1. The problem we encountered in comparing the derivations of (6) and (7) are now encountered in the derivation of a **single** sentence. And a sequence of three rules applies twice in the same order.

4. *Conclusion*

The solution to the problem is the recognition of the *Transformational Cycle*. Some transformation rules are now recognized to be cyclic and to apply in a particular way (Chomsky 1965:134-35):

> In addition to the rules of the base, ... the grammar contains a linear sequence of singular transformations. These apply to generalized Phrase-markers cyclically, in the following manner. First, the sequence of transformational rules applies to the most deeply embedded base Phrase-marker [first, S_5 in Figure 6, and to any other bottom-most Ss which might have occurred in another chain of embeddings] ... Having applied to all such base Phrase-markers [i.e., to S_5], the sequence of rules reapplies to a configuration dominated by S in which these base Phrase-markers are embedded [i.e., to S_4 in Figure 6] ... and so on until finally the sequence of rules applies to the configuration dominated by the initial symbol S of the entire
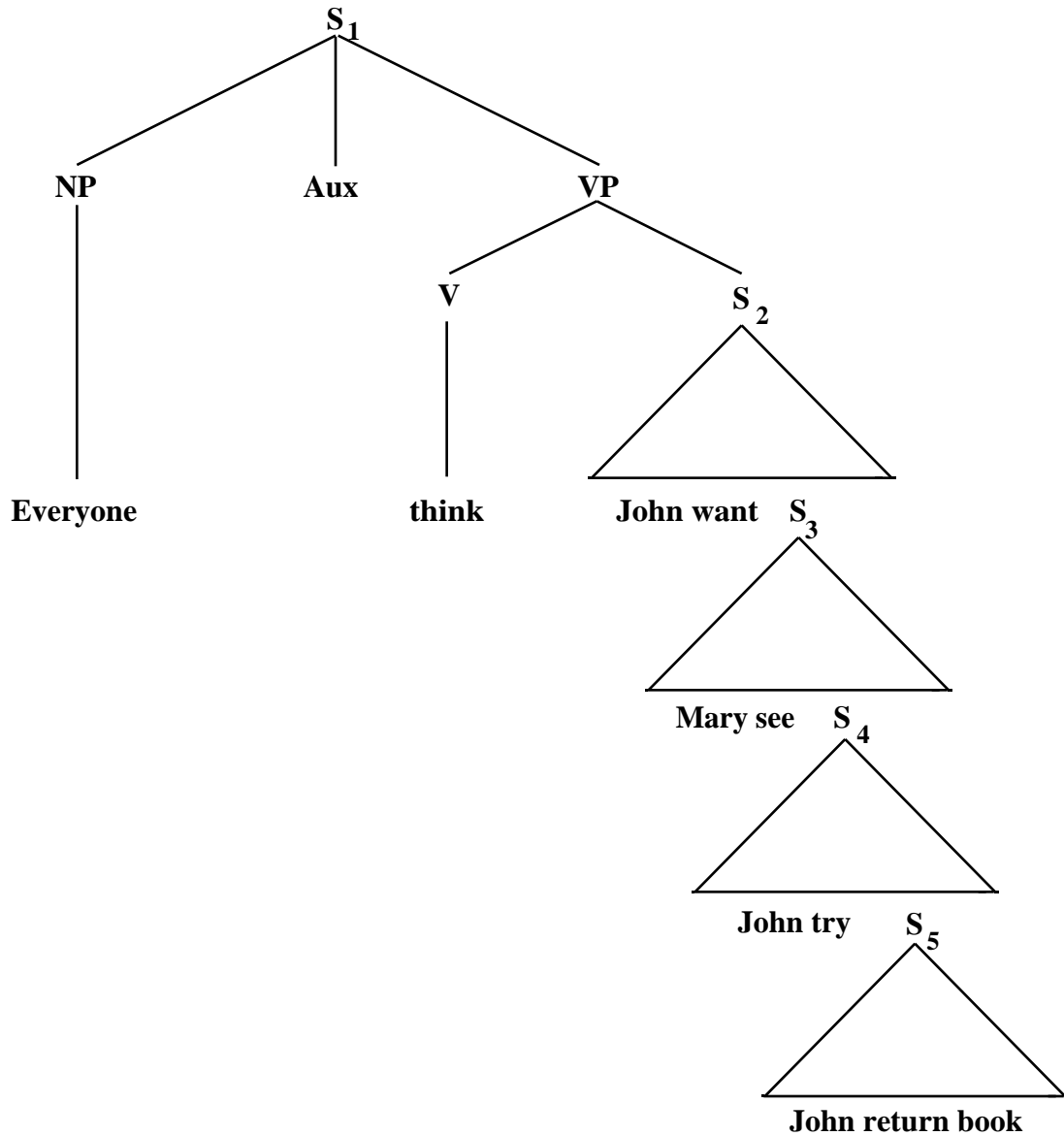
generalized Phrase-marker ...[3]

Figure 6: *A deep structure with multiple embedding.*

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[3] The term 'generalized Phrase-marker' and not 'generalized transformation' is used to label a phrase structure which contains an embedded **S**. When the transition from the earlier stage of TGG to the classical period is made, generalized transformations no longer exist, but their effects are now achieved by the Phrase Structure Rules, or rules of the Base. 'Generalized Phrase-marker' is a holdover term.

The effect of this is to remove the ordering paradoxes. The apparent contradiction in the order of application is in fact the interaction of the ordered rules and their cyclical application in complex structures. Such examples as these support the argument for the Standard Theory of *Aspects of the Theory of Syntax* (Chomsky 1965:135):

> The grammar now consists of a base and a linear sequence of singulary transformations. These apply in the manner just described. The ordering possibilities that are permitted by the theory of Transformational-markers but apparently never put to use are now excluded in principle. The notion of Transformational-marker disappears, as does the notion of generalized transformation. The base rules form generalized Phrase-markers that contain just the information contained in the basis and the generalized transformations of the earlier version. But observe that in accordance with the Katz-Postal principle ..., it is precisely this information that should be relevant to semantic interpretation. Consequently, we may take a generalized Phrase-marker, in the sense just defined, to be the deep structure generated by the syntactic component.

Notice how **familiar** this is. Bloomfield had early on outlined a grammatical system in which each term was correlated one-to-one with a kind of semantics, e.g. sememe, grammatical meaning, episememe, etc. with the effect that if one described the grammar, the semantics was in a sense known or determined. It had a structure isomorphic with the grammar. In this way, grammar was independent, and semantics was derived from grammar by interpreting it in some unspecified way.

The Standard Theory of TGG now does the same. If we know the Deep Structure of an utterance we can interpret its semantics since that structure determines its meaning. Again, meaning is dependent, and grammar/syntax (more generally, form) is the more powerful component of language, being independent from all others. Plus ça change ...

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