THE STATUS OF THE PROJECTION PRINCIPLE IN GOVERNMENT-BINDING THEORY

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ABSTRACT

The role of the Projection Principle within Chomsky's Government-Binding (GB) Theory is to preserve the subcategorisation properties of lexical items at all levels of syntactic representation, viz. D-structure, S-structure, and Lexical Form. Arguments have been made that the Projection Principle is a new concept that is simply an extension of the Transformational Component (XFM) and Emonds' Structure-Preserving Constraint (SPC), and that it does not deserve the high status it has been accorded in GB theory. This paper provides evidence, based on sentences involving movement operations, that the Projection Principle is innovative and that it convincingly addresses what the XFM and SPC have failed to address.

Keywords: Projection Principle, Transformational Component, Structure-Preserving Constraint, Case Filter, Theta Criterion

1. INTRODUCTION

The Projection Principle is the fundamental tenet of Government-Binding (GB) Theory, which regulates the mapping between levels of syntactic representation, viz. D-structure, S-structure, and Lexical Form (LF) (Sells, 1985). This principle posits the constraint that a noun phrase (NP) position must be preserved at all of these levels. Put differently, the Projection Principle requires that the subcategorisation properties of lexical items be preserved at all levels of syntactic representation (Newmeyer, 1986). Haegeman (1992: 47) describes the Projection Principle as follows:

Projection Principle: Lexical information is syntactically represented.

The pre-GB generative theories distinguish the transformational component (XFM) and constraints on transformational rules, such as *inter alia* the Emonds' Structure-Preserving Constraint (SPC). The XFM stipulates the Structural Description (SD) and Structural Change (SC) of sentences, and maps Deep-Structure to Surface-Structure by means of transformational rules (Chomsky, 1995; Fromkin, Rodman & Hyams, 2003). The SPC's task seems to be similar to that of the Projection Principle in that it regulates and preserves structural configurations of elements from one level of representation to another.

The aim of the paper is to determine whether the Projection Principle in GB theory is a new and innovative concept able to address issues that the XFM and SPC in earlier generative theories failed to address; or whether it is simply a new name embracing or representing the XFM and SPC in that it still addresses – albeit in a slightly extended fashion – the same issues that used to be addressed by the latter. The latter aim is in line with Newmeyer's (1986: 205) claim that "the Projection Principle can be thought of as a vastly strengthened Structure-Preserving Constraint". This claim is tantamount to the claim that subjacency is simply an embracing term for Ross' constraints on movement such as the Sentential Subject Constraint, Complex Subject Constraint, and Coordinate NP Constraint (Radford, 1988), which also needs to be explored further in order to verify its veracity.

Passive sentences and sentences involving empty categories, particularly those in which NP and Wh (Wh words in question formations such as who, why, when, where, what, which and how) movements occur, will be looked at to determine the status of the Projection Principle. Within GB, movement by definition creates a trace (Lasnik & Uriagereka, 1988). The relevance of sentences involving movement operations in addressing the research problem is that constituents change positions from one level of representation to another and traces are left to demarcate the base-generated positions of moved constituents (Lasnik & Saito, 1992). This is where the Projection Principle intervenes to see to it that the moved constituents preserve their structural configurations at all levels.

The first thing to determine is how the XFM and SPC account for such sentences, focusing specifically on their limitations. The second thing to determine is whether the Projection Principle is able to remedy such limitations in convincing ways and whether it has any limitations itself in attempting to provide an adequate account of such sentences.

A conclusion will be drawn on the status of the Projection Principle, i.e. whether it deserves the high status it has been accorded in GB or whether it is simply a reformulation of previous constraints. The findings of the paper will hopefully shed some light on the question of whether there is a need to do away with or constrain the XFM and abandon the SPC.

2.   THE TRANSFORMATIONAL COMPONENT

The constituents of Transformational Grammar (TG) within Chomsky's (1965) standard theory can be captured in the following representation:

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          ┌─────────────────────────────────┐
          │            LEXICON              │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │  PHRASE STRUCTURE (PS) COMPONENT │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │         DEEP STRUCTURE          │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │ TRANSFORMATIONAL COMPONENT (XFM) │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │        SURFACE STRUCTURE        │
          └─────────────────────────────────┘
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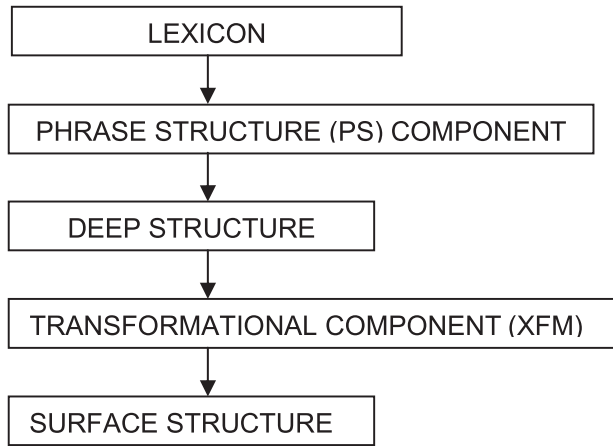
Figure 1: Constituents of Transformational Grammar

Before looking at the XFM, it is worthwhile to determine the role played by the phrase structure (p-s) component. The p-s component stipulates p-s rules, which have the function of regulating the expansion of sentences (Fromkin *et al.*, 2003; Smith, 2000). P-s rules are, however, redundant in that there is a rule formulated for expanding every phrasal category in generating phrase markers (Sells, 1985; Smith, 2000). P-s rules are thus construction specific (Matthews, 1994). The system of listing rules for every construction is quite cumbersome and unconstrained and lacks generalisation. These rules provide a fixed order of constituents in a sentence and are thus language specific. The rules are also posited to license the occurrence of arguments, but fail to give a satisfactory account of such occurrences. This is observable, for example, in passive sentences where the object takes the subject position while the subject becomes a complement to a preposition (De Beaugrande, 1997; Radford, Atkinson, Britain, Clahsen & Spencer, 1999).

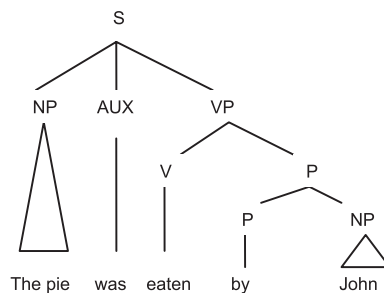1. The pie was eaten by John.

Figure 2: A tree diagram for a passive sentence

The arguments in 1. change their thematic roles from one level of representation to another. For example, at Deep-Structure, the NP *the pie* is a patient, but at Surface-Structure it is an agent. Similarly, the NP *John* is an agent at Deep-Structure but a preposition complement at Surface-Structure. P-s rules lack coherence because of unmotivated changes such as these.

Transformational rules in the XFM attempt to resolve this situation by positing the SD and SC along the following lines:

	NP	AUX	VP	NP
SD	1	2	3	4
SC	4	2 + be	3 + en	by + 1

Figure 3: Structural Description and Structural Change for a passive sentence

Although transformational rules are powerful, they give no motivation firstly as to why such changes occur, and secondly why moved constituents occupy the positions they do at Surface-Structure. They are also redundant because for every change that occurs in a sentence, a specific transformational rule such as passive, negative, Equi-NP deletion, question, tough movement, etc. is posited to account for such a change.

In the subsequent frameworks – the Extended Standard Theory (EST) (Chomsky, 1972) and Revised Extended Standard Theory (REST) (Chomsky, 1986) – the XFM is being constrained and in GB an attempt is being made to account for sentences such as 1. by means of a few constrained principles. As discussed in section 5, the Minimalist Programme relinquishes the D-structure and S-structure, and explains movement operations through the notion of economy, thereby effectively abandoning the Theta Criterion and the Projection Principle which operate at these levels of representations (Chomsky, 1995; Smit, 2000).

In the EST and REST, the XFM is constrained by two kinds of constraints on movement, viz. extraction constraints and positioning constraints (Newmeyer, 1986). The former are concerned with preventing transformational rules from moving elements from certain positions. The latter are concerned with preventing transformational rules from moving elements into particular positions. Emonds' Structure-Preserving Constraint, which is discussed next, is a constraint on positioning (Radford, 1988).

3. EMONDS' STRUCTURE-PRESERVING CONSTRAINT

Newmeyer (1986: 149) describes the SPC as follows: "Put simply, this constraint states that a transformational rule can move an element of category C in a position in a phrase marker held by a node of category C". Radford (1988: 190) describes the SPC as follows:

Structure-Preserving Constraint: A constituent can only be moved by a substitution rule into another category of the same type.

With regard to NP movement, for example, an NP will be moved into an NP node in a tree. Radford (1988) also argues that an AP and a PP can be substituted by an AP and a PP respectively. That is, a given category X^n can only be substituted by another category X^n. It is therefore expected that a moved Wh phrase will occupy a position similar to the one from which it moved. At Deep-Structure, the position from which the category moved is left empty so that another category of the same type can occupy the empty node. The empty node at Surface-Structure results in the ungrammaticality of the sentence (Newmeyer, 1986).

3.1 NP Movement and the Structure-Preserving Constraint

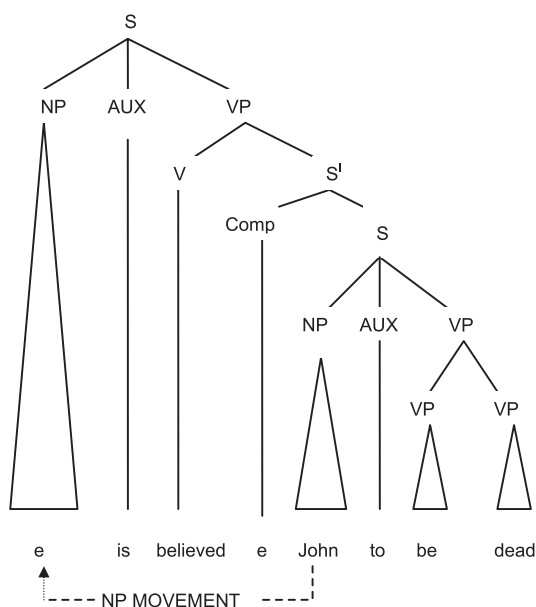2. John is believed to be dead.

Figure 4: A tree diagram for a sentence involving NP movement

In 2. the NP *John* is raised from the embedded subject position to the subject position of the matrix sentence. NP movement is referred to as a subject-to-subject raising (Radford, 1988; Sells, 1985) since the NP moves or is raised from one subject position to another. NP raising is therefore a structure-preserving transformation that Emonds (1976) contends introduces the NP (*John* in 2.) into a phrase-marker position held by an NP node. According to the SPC it cannot be expected, for example, that the NP *John* will move into the empty Comp position in the tree, since such a movement will be non-structure preserving and will, as a consequence, violate the SPC.

It should be noted that the SPC, like the XFM, says nothing about why the NP *John* moves from its Deep-Structure position to the position it occupies at Surface-Structure. It is only concerned with the type of position into which the NP *John* moves. Emonds (1986) claims that NP-raising moves an NP into a position it is permitted to enter by independently motivated p-s rules. It was indicated earlier that p-s rules were redundant and were consequently abandoned. The fact that the SPC depends on p-s rules to motivate the movement of NPs into certain nodes renders the SPC a weak constraint. The failure to stipulate the motivating factor behind NP movement, and to depend on p-s rules in doing so, is one limitation of the SPC.

3.2 Wh Movement and the Structure-Preserving Constraint
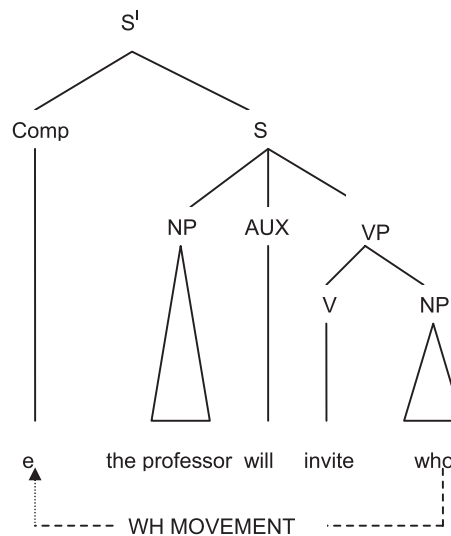
3. Who will the professor invite?

Figure 5: A tree diagram for a sentence involving Wh movement

The Wh phrase *who* is base-generated at the direct object position of the verb *invite*. It is an NP fronted by question formation. Since the Wh phrase is an NP, it would be expected that it would move into a phrase position that is an NP node in accordance with the requirements of the SPC. But, as the phrase marker in Figure 5 indicates, this is not the case: the Wh phrase moves from an NP node to a Comp node preceding the subject position.

The same argument holds when the moved Wh phrase is an AP or PP. For example,

4.   Why did you steal her car?
5.   In which box would you put that cake?

In 4. the moved Wh phrase is an AP and in 5. it is a PP. They both move into a Comp position in a phrase marker.

It is clear from 3., 4. and 5. that the SPC fails when confronted with sentences that involve Wh movement. As Emonds (1976: 182) explains: "Thus if we considered WH fronting solely as a transformational operation on phrase nodes, it would violate the structure-preserving constraint". The failure to account for Wh movement is the second limitation of the SPC. Newmeyer (1986; 151) confirms it thus: "…some of the most problematic areas of English syntax, such as the analysis of Extraposition and Wh-Movement, have also been most problematic for the Structure Preserving Constraint".

4.   THE PROJECTION PRINCIPLE IN GOVERNMENT-BINDING THEORY

Within Chomsky's GB theory, a rule of move-alpha (move-α) is applied to the D-structure and S-structure of sentences to derive their S-structure and LF respectively (Haegeman, 1992). The categories that undergo movement are of two types, viz. zero-level (V^0) and maximal projections (XP) (Chomsky, 1986). This paper is confined to addressing the movement of maximal projections, focusing specifically on the extraction site and landing site of such movement. The basic claim within this framework has been that movement by definition creates a trace (Radford *et al.*, 1999).

It is a requirement of move-α that NP and Wh movements leave behind a trace (Smith, 2000). In so doing, information from D-structure is also preserved at S-structure and LF through the existence of a trace. The positions of moved constituents are preserved at all levels of representation. The Projection Principle is responsible for doing this by regulating the mapping between D-structure and S-structure and between S-structure and LF (Haegeman, 1992).

The X^{i}, case and theta theories within GB will *inter alia* be explored to determine the status of the Projection Principle. The X^{i} theory will help to generate phrase markers of sentences with traces and will indicate the extraction and landing sites of movement (Speas, 1990). Case theory is the motivating factor behind NP movement – an NP moves in order to satisfy the Case Filter. Sells (1985: 53) describes the Case Filter as follows:

Case Filter: *NP, if NP has phonetic content and no case.

What the Case Filter means is that every phonetically overt NP must be assigned case (Chomsky, 1995), otherwise the sentence would be ungrammatical.

The Theta Theory regulates the assignment of theta roles to traces of moved constituents by means of the Theta Criterion. Sells (1985: 37) describes the Theta Criterion as follows:

Theta Criterion: Each argument bears one and only one theta role, and each theta role is assigned to one and only one argument.

The Projection Principle thus interacts with the Case Filter and Theta Criterion in preserving NP positions at all levels of representation. It should be noted, however, that while the Case Filter applies only at S-structure, the Theta Criterion, like the Projection Principle, operates at all levels (Haegeman, 1992). It can be said that the Projection Principle interacts with the Theta Criterion more frequently and the bond between the two is stronger than that between the Projection Principle and the Case Filter.

4.1   NP Movement and the Projection Principle

NP movement is induced by passive verbs and raising verbs and adjectives (Chomsky, 1986; Jacobson, 1990). An NP that follows these categories occupies a caseless position – passive verbs are unaccusative, i.e. they do not have the capacity to assign accusative case, and adjectives are not case assigners. In order to meet the requirements of the Case Filter, the NP obligatorily moves from a non-case position to a case position, which is the empty subject position of the finite clause where it is assigned nominative case by the finite INFL. An NP undergoes an A movement (Radford *et al.*, 1999) and leaves an A trace, and together they constitute an A chain (Haegeman, 1992). An A antecedent is assigned case at S-structure and the trace is assigned a theta role at any level. The antecedent receives a theta role through the chain it forms with a trace. In sum, the extraction site of movement is a caseless but theta-bearing position, while the landing site is a case but theta-bar position (Haegeman, 1992).

6.   John$_i$ is certain t$_i$ to leave

```
                          IP
                  _____|_____
                 NP                I'
                 |          _____|_____
                 |        INFL            AdjP
                 |      ( +Tense )     ____|____
                 |      ( +AGR  )     Adj       IP
                 |                    |      ___|___
                 |                    |     NP      I'
                 |                    |     |    ___|___
                 |                    |     |  INFL    VP
                 |                    |     |  (-Tense)  △
                 |                    |     |  (-AGR )
                 |                    |     |    |
               John$_i$      is    certain  t$_i$  to   leave
                 ↑_____|
                        NP MOVEMENT
                         (A Chain)
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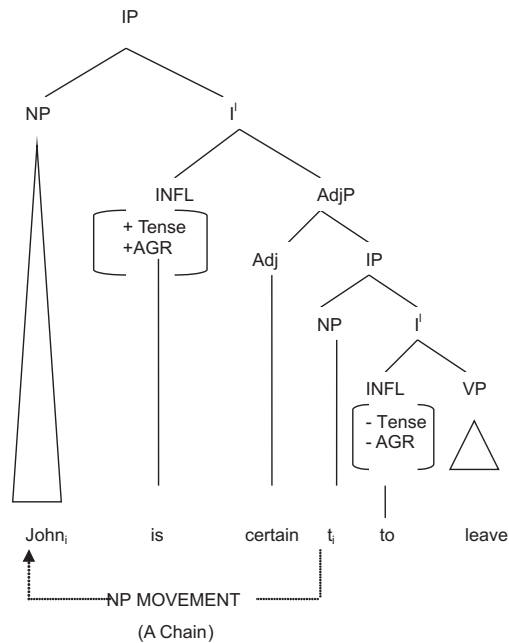
Figure 6: A tree diagram for a sentence involving NP movement leaving a trace behind

In 6. the NP *John* is the subject of the infinitive clause. At this position it does not receive case since an infinitival INFL is not a case assigner. To receive case and consequently satisfy the Case Filter, the NP *John* moves obligatorily to the [Spec, IP] position where it is assigned nominative case by the finite INFL. This movement is triggered by the adjective *certain*, which is a raising adjective. It is a raising adjective, because it raises the NP to the case position. The NP trace left by movement is assigned an external theta role by the verb *leave* in the lower infinite clause, since the adjective *certain* is not in any thematic relation to this trace. The trace is assigned an external theta role since, as a subject, it is not subcategorised by the verb *leave* (Sells, 1985).

Since *John* occupies a theta-bar position at S-structure, it receives a theta role through a chain it forms with its trace. Therefore, *John* receives the same theta role at both D-structure and S-structure through the existence of a chain. This is made possible by the Projection Principle, which regards the positions of lexical items as fixed at all levels.

4.2   Wh Movement and the Projection Principle

The formation of a Wh question results in the occurrence of Wh movement. However, Wh movement may also occur in the formation of relatives, comparative clauses, topicalisation, and clefting (Berwick & Weinberg, 1984). This section focuses exclusively on Wh movement in question formation.

Wh movement in question formation involves moving the Wh word from its D-structure position to the [Spec, CP] position, which is the pre-clause position at S-structure. This assertion does not ignore the fact that movement may occur from S-structure to LF as illustrated by sentence 8 below. The Wh antecedent is linked to its trace by coindexation and together they form an A^I chain. Thus, a Wh phrase is an A^I antecedent, which leaves an A^I trace by A^I movement. The Wh trace is assigned both a theta role and case. In sum, the extraction site of Wh movement is a case and theta position where a case and a theta role are assigned to the trace, while the landing site is a caseless and theta-bar position (Haegeman, 1992). It should be noted, however, that traces of adjuncts are not assigned both case and theta role since they are not NPs or arguments.

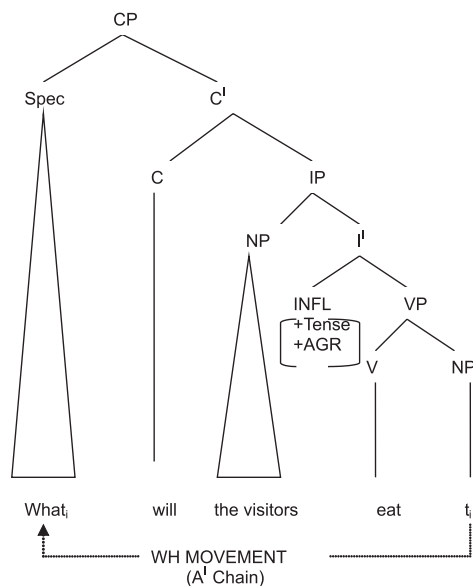7. $What_i$ will the visitors eat_i?

Figure 7: A tree diagram for a sentence involving Wh movement leaving a trace behind

In 7. the Wh phrase *what* moved from the direct object position at D-structure, where it left its trace, to the [Spec, CP] position at S-structure. The trace is assigned both accusative case and the internal theta role by the verb *eat*. The Wh phrase receives case and theta role through the A^{i} chain it forms with its trace (Haegeman, 1992). Again, the Projection Principle ensures that the D-structure position of the moved Wh phrase is preserved at S-structure through the trace. The Case Filter and the Theta Criterion help the Projection Principle in this preservation by respectively assigning case and theta role to the trace.

The following examples of Wh movement are an indication of how the subcategorisation features of lexical items are preserved from D-structure to S-structure to LF through the existence of traces, as is required by the Projection Principle (Sells, 1985):

8.   (a) D-structure: $[_{CP}[_{Spec}]$[who INFL read what]
        (b) S-structure: $[_{CP}[_{Spec}$ who$_i]][_{IP}$ t$_i$ INFL read what]
        (c) LF: $[_{CP}[_{Spec}$ what$_j][_{Spec}$ who$_i]][_{IP}$ t$_i$ INFL read t$_j]$

In 8.(b) *who* moved from the [Spec, IP] to the [Spec, CP] position in the syntax. In 8.(c) *what* moved from the direct object position of the verb *read* to the [Spec, CP] position at LF. These movements left behind traces that preserve the subcategorisation properties of the verb *read*. The Case Filter and the Theta Criterion assist the Projection Principle by respectively assigning case and theta role to the Wh trace.

5.   THE MINIMALIST PROGRAMME

Chomsky's theory has been undoing revisions over the years. The GB theory was immediately followed by a new invention, viz. the Minimalist Programme. Radford (1997: 515) defines the Minimalist Programme as follows:

<u>Minimalism</u>: A theory of grammar whose core assumption is that grammars should be described in terms of the minimal set of theoretical and descriptive apparatus necessary.

5.1   Levels of representation within the Minimalist Programme

The notion of "government", which has hitherto been playing a central role in GB, has disappeared, and so has the distinction between D-structure and S-structure. Unlike GB, in which four levels of representation were distinguished, viz. D-structure, S-structure, Phonetic Form (PF) and LF (Epstein, Thrainsson & Zwart, 1996), the Minimalist Programme introduces just two levels of representation in the grammar, viz. PF and LF (Smit, 2000), thereby effectively rendering insignificant the Projection Principle and the Theta Criterion which operated at D-structure, S-structure and LF.

Chomsky (1995) claims that the Projection Principle and the Theta Criterion have no independent significance at LF. Nevertheless, at D-structure, these two principles are needed to make the picture coherent; but should the picture be abandoned, then they will lose their primary role. The principles are therefore dubious on conceptual grounds. Eliminating the D-structure essentially allows these principles to be dispensed with.

The Minimalist Programme purports that if the role of a grammar is to link sound and meaning, then it becomes impossible to do without the two levels, which constitute the interfaces with articulation and perception (PF) and with the conceptual system (LF) (Chomsky, 1995). Therefore, all constraints on grammatical processes are motivated by either perceptual or conceptual considerations (Smit, 2000).

5.2 The principle of economy

Central to the Minimalist Paradigm is the notion of *economy* which claims that some principle of least effort is characteristic of the language faculty (Smit, 2000; Zwart, 1996) and favours shorter movements over longer ones (Radford, 1997: 275).

The notion of economy can be used to explain sentences involving Wh-movement:

9.   (a)   I think Paul kicked the ball
    (b)   What do you think Paul kicked?
    (c)   Who do you think kicked a ball?
    (d)   Who do you think kicked what?

10. *What do you think who kicked?

Given 9. and 10. above, the question to ask is why can't *what* move to the front of the clause in 10. and why is 10. ungrammatical? The answer is simply that 10. is less economical than 9(d) in that while both sentences contain exactly the same words, *who* starts out closer to the [Spec, CP] position than *what* does. Therefore, where either of two elements could move, the "Shortest Movement" condition determines that only the one which has less distance to travel is permitted to move (Chomsky, 1995; Smit, 2000; Radford, 1997).

It is evident that the Minimalist Paradigm explains movement operations in a different manner. This notwithstanding, the Projection Principle played a pivotal role in GB in explaining movement operations and accounting for the moved constituents at different levels of representation.

6.   CONCLUSION

The Projection Principle rules out some of the properties allowed by transformational rules in the XFM, such as, for example, turning D-structure objects into subjects at S-structure. The Projection Principle requires that once a lexical item is an object (or subject) at D-structure, it remains an object (or subject) at S-structure and LF (Sells, 1985). This is done by the licensing of traces indicating the base positions of lexical items in the case of movement.

The XFM and SPC attempted to account for the movement of phrases without revealing why such movement took place. The Projection Principle, in contrast, interacts with the Case Filter and Theta Criterion to account for movement. An NP obligatorily moves in order to satisfy the Case Filter, which thus regulates the distribution of NPs. The Theta Criterion ensures that this happens by projecting thematic roles at each level of representation. With regard to Wh movement, the Wh phrase may be manifested as an NP, AP or PP. Irrespective of the phrasal category, Wh movement lands at the [Spec, CP] position, while cases and theta roles are assigned at the extraction site, i.e. the trace position. The SPC, because of its specificity with regard to the landing site, fails to account for Wh movement. It would be expected, in accordance with the SPC, that the NP, AP and PP Wh phrases would land at the NP, AP and PP nodes respectively. This was not the case, as indicated in 3.2 above.

Since the Projection Principle, in interaction with the Case Filter and Theta Criterion, can adequately account for NP and Wh movement, it can be claimed, by generalisation, that it can account for any type of movement in a language. As a result, it cannot be merely regarded as a vastly extended structure-preserving constraint, as Newmeyer (1986) points out. The SPC was too specific and could not generalise to other instances of movement, including Wh movement. Moreover, the SPC depended on the redundant p-s rules to verify some of its claims.

Although the Projection Principle has been abandoned in the Minimalist Programme, it has proven to be an innovative concept in GB that by far outweighs the XFM and SPC. It therefore deserves the high status it is accorded in GB. It was thus necessary in syntactic studies to do away with or constrain the XFM and abandon the SPC. In this paper, no limitations of the Projection Principle could be identified, particularly in dealing with sentences involving movement operations.

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