The government-binding theory: An overview
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The aim of this paper is to make available the main ideas of the government-binding theory, as presented by Noam Chomsky in a workshop given in Pisa in the spring of 1979, to a wider public than is the case now. In doing this we hope that many people who do not have direct access to 'the inner circles of Chomskyan linguistics' will be able to follow and evaluate the latest theoretical developments.

One remark is in order here: we have chosen to present the government-binding theory as it was presented by Chomsky in the workshop following the GLOW Conference 1979 in Pisa, without comment and without evaluation. We have decided to do so, not because it needs no discussion, but because this theory is still virtually inaccessible to many linguists in and outside Europe. In order to make it possible for a broader group of linguists working or interested in the Extended Standard Theory to keep up as much as possible with the latest developments, we decided to make the Pisa system available before it is outdated by more recent developments, as was the case with On Binding, which has been circulating in a mimeographed version for almost two years and has only just appeared in Linguistic Inquiry. Another choice we have made is to restrict ourselves mainly to the technical aspects of the system since we consider it more interesting for people to know how a specific system works and to appreciate its internal consistency, rather than to present the underlying plausibility considerations of a system whose details remain unclear. For these reasons we have

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thought it better to present the theory as it was presented by Chomsky.

To make this abstract we used a tape of Chomsky's lectures, recorded and typed out by Jean-Yves Pollock.

The paper is structured as follows: in the first section we will present some reflections on the idea of Universal Grammar and its instantiation: Core Grammar, together with a brief sketch of the internal organization of the grammar, the so-called T-model. In the next section we will outline the theoretical framework in which the government-binding theory has arisen, against the background of the developments of the theory of anaphora, i.e. approximately since Conditions on Transformations (Chomsky, 1973). The third and main section will be devoted to an exposition of the main lines of the government-binding theory.

I. EST and the theory of grammar

The program of Chomsky's government-binding theory will hardly be understandable nor can its significance be appreciated if the theory of language in the context of which it developed, is not clear. We therefore think it necessary to briefly point out certain theoretical assumptions and concepts that lie at the basis of the Extended Standard Theory (EST).

The goal of linguistic theory is to provide an explanation for the language-faculty — seen as a biological endowment — as reflected in the linguistic competence of the speaker-hearer, rather than to produce linguistic descriptions for any given language. This implies a level of abstraction from language to grammar, where grammar is taken to be a model of the linguistic knowledge of the language user. In a parallel fashion, the process of language acquisition can be seen as the child's construction of a grammar, on the basis of highly defective evidence. In order to account for the problem of learnability, i.e. the problem of underdetermination in the choice of an adequate grammar, it is assumed that there is a system of principles, called Universal Grammar (UG), that heavily restricts the grammars that it allows to formulate. The task of linguistics can therefore be viewed as the exploration of the properties of UG.

One of the first things that must be emphasized is that UG must be constructed in such a way as to make only a limited number of grammars available to the language learner, in view of the above-mentioned problem of underdetermination. On the other hand, it must allow for variation between languages. In order to account for language variation the notion Core Grammar is introduced. The
grammar of an actual language might be thought of as consisting of a core and a periphery, where the core part can be considered as the unmarked part of the grammar and is derived more or less directly from UG by fixing the parameters of UG. For example UG is assumed to incorporate the rule ‘Move α’, and the core grammar of an actual language fixes the values of α. In this way, languages are predicted to differ considerably with respect to the periphery, while as far as the core is concerned variation is restricted.

Having indicated the main issues in linguistic theory, we may now turn to the components of core grammar itself, and to the rule types that belong to it. The basic insight that underlies the internal organization of core grammar is the idea that grammar is a system that consists of various interacting (sub)components with distinct properties. Changes in one component are bound to affect other components. So, for instance, the core rule of the transformational part of the grammar, stated as ‘Move α’, will obviously overgenerate, i.e. produce many ungrammatical structures. This means that such a simplification of the transformational part of the grammar will put a heavy burden on another part of the grammar. It should be noted that it is mainly an empirical matter where the price for a simplification in some (sub)component will have to be paid (ideally, no price will have to be paid at all).

Core grammar consists of a base that contains the lexicon and a categorial component; the categorial component is governed by the principles of the X-bar system, cf. Chomsky (1970), Emonds (1976), Jackendoff (1977). Transformational rules are applied to structures generated by the base and they obey the general rule schema of ‘move α’, where α is a phrase or a category. For a language like English, α can be an NP or a wh-phrase. The structure which results after application of transformations, is called S-structure\(^1\). There are two separate components which have this S-structure as their input: one component relating to phonology via devices affecting the phonological shape of sentences, such as rules of deletion, filters and stylistic rules; the other component relating to semantics and containing those aspects of meaning which are determined by sentence grammar. In this interpretive part of the grammar, referred to as Logical Form (LF), there are rules of bound anaphora, which in a wide sense comprehend the interpretation of reflexives, reciprocals, possessives, PRO and trace, and rules of quantifier interpretation.

This model of Core Grammar is called the T-model, schematically represented as follows:

\(^1\) The term S-structure has been chosen to avoid the term Surface structure, since this term has caused confusion in the literature.
The empirical claim about this division in the grammar is that the phonological part and the LF part are autonomous subsystems. So, for instance, under certain conditions \textit{wh}-phrases in COMP (the sentence initial position) may delete in the phonological part of the grammar, while at the level of LF the \textit{wh}-phrase must be present in order for the structure to be interpretable.

II. \textit{The development of a theory of anaphora}

Roughly, two main lines of research, not always independent of each other, can be distinguished in the development of the EST since \textit{Conditions on Transformations} (Chomsky, 1973). One line concerns the distinction between NP movement rules and \textit{wh} movement rules, and the rule ‘move \textit{\alpha}’ that generalizes over both. The differences between NP movement and \textit{wh} movement are considered to be due to internal properties of the phrases in question. As far as NP movement is concerned, it is held to be subject to structure preservingness (cf. Emonds, 1976), a property that is now considered to follow principles of LF, since what is involved in NP movement are essentially two argument positions. \textit{Wh} movement, on the other hand, which unlike NP movement is seemingly unbounded (in terms of domains), takes place to the left of a sentence, a position called COMP, in which position also sentence introducing particles (complementizers) occur. This position is not an argument position. The ‘logical’ status of a \textit{wh}-phrase in COMP is comparable to a quantifier that binds a variable in its domain; in case of \textit{wh} movement the variable is the empty category in the position vacated by \textit{wh} movement to COMP. One main line of research can therefore be considered to be constituted by the elucidation of the properties of \textit{wh} movement and the COMP node. In this connection it is also important to note work done by May and Kayne on quantifiers and their scope and the rule of Quantifier Raising (QR), a LF rule that makes it possible to equate the structures resulting from \textit{wh} movement with structures involving existential and universal quantification, to which structures Quantifier Raising has applied.

The other main subject of investigation within EST is the one
that concerns anaphora, to which subject we shall dedicate the remainder of this section, since it is more relevant to the questions that the government-binding theory seeks to answer.

To begin with the program of *Conditions on Transformations*, it is clear that it was and still is an ambitious program, aiming as it did at establishing certain general principles of grammar underlying both movement and interpretive rules, which plausibly could be thought of as being part of UG (cf. Graff, 1979, for a more detailed account).

It was soon realized that if there are common principles underlying both movement and interpretive rules, then it seems more economic, as well as insightful, to state those principles at one level only. This realization led to the development of the interpretive component of the grammar, called Logical Form. This shift to LF was furthermore independently supported by the development of trace theory, which made it possible to view the relationship between a moved phrase and the position it had been moved from as an anaphoric relationship: the moved phrase being the antecedent of the empty category left behind (the anaphor). It was also supported by the introduction of the notion c-command\(^2\) as the structural relation that holds between anaphors and antecedents, whether lexical anaphors like reflexives and reciprocals or nonlexical anaphors like PRO or trace.

The development of the theory of anaphors within EST up to and including the government-binding theory is not completely straightforward, since important changes are involved.

In the first place, the range of phenomena accounted for by the various conditions on anaphoric relationships and later by the various binding conditions oscillates considerably as will be obvious from the following. In *Conditions on Transformations* two conditions on anaphoric relationships are proposed: the Specified Subject Condition (SSC) and the Tensed S Condition, later called the Propositional Island Constraint (PIC). They were expressed as follows\(^3\):

\[
\text{In the configuration } \ldots \text{X} \ldots [\ldots \text{Z} \ldots \text{WYV} \ldots ]
\]

X may not be related to Y, if Z is the specified subject, i.e. a subject not controlled by X, of \(\alpha\), or if \(\alpha\) is a tensed sentence

\(^2\) C-command: \(\alpha\) c-command \(\beta\) iff \(\alpha\) does not dominate \(\beta\), and \(\beta\) does not dominate \(\alpha\), and the first branching node by which \(\alpha\) is dominated, dominates \(\beta\) (cf. Reinhart 1976). This notion of c-command is a refinement of the notion of command as introduced by Langacker, to account for coreference restrictions on anaphors.

\(^3\) In fact, the formulation given in *Conditions on Transformations* is somewhat more complex.
These conditions were supposed to account for the following sentences:

1. *the rabbits_i believed [s Alice to like themselves_i]
2. *John_i seems to the men_i [s t_i to like each other_i]
3. the men_i seem [s t_i to like each other_i]
4. *Mary promised John_i [s that she would shave himself_i]
5. John promised Bill_i [s that he would shave him_i]

In sentences (1) and (2) the SSC can be seen at work: in (1) the lexical subject Alice blocks the relationship between the reflexive and the matrix subject the rabbits; in (2) John binds the trace in subject position of the embedded infinitive, which trace functions as the specified subject, thereby blocking the relationship between the men and the reciprocal. Sentence (3) is grammatical because the matrix subject the men binds the subjects of the infinitive, so (3) is not excluded by either SSC or PIC. In (4) the relationship between John and himself cannot be established because the reflexive is in a tensed sentence, and also because of the specified subject she (we will return to this redundancy below). In (5) there are coreference possibilities between he and him and either John or Bill, since the rule of Disjoint Reference, which blocks coreference between he and him, cannot apply in these cases because of SSC and PIC.

The On Binding system (Chomsky, 1979) is based on the realization that the notions specified subject and tensed clause could be replaced by the notions subject and nominative. As was evident from sentences (4) and (5), they exhibit a certain overlap. This is partly a consequence of the property of tensed clauses, that they require lexical subjects, while infinitivals typically lack lexical subjects and need controlled PRO subjects. Put differently, as far as (4) and (5) are concerned, if an object of a certain type is excluded from a given structure due to the presence of tense, then that structure is also ruled out as a consequence of the presence of a specified subject.

On the other hand, the generalization concerning the complementary distribution of lexical NP and the controlled PRO subject of infinitivals is somewhat blurred by the Raising construction (as exemplified in (2) and (3)), where it is assumed that the matrix subject has been raised from the embedded clause, leaving a trace in the subject position of the infinitival clause, and, more seriously, by the infinitival complements of verbs like believe which do admit a lexical subject\(^4\). The program of On Binding can be summarized as

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\(^4\) The infinitival complements of verbs of the type of believe are also
follows: the main binding principle is Opacity which subsumes the former SSC. Since traces and PRO can bind anaphora in their domain the qualification ‘specified’ of the SSC can be dispensed with in favor of the purely syntactic notion subject. Opacity is formulated as follows:

If \( \alpha \) is an anaphor in the domain of the subject of \( \beta \), then \( \alpha \) cannot be free in \( \beta \) (‘free’ means not-bound, expressed by indexation\(^5\)).

Considering again sentences (1)-(5), we can say that (1), (2) and (4) are all excluded by Opacity. As far as the former PIC is concerned, if we manage to exclude lexical NPs from the subject position of infinitivals\(^6\), we can limit the PIC to the subject position of tensed clauses, which has to be lexical and non-anaphoric. In On Binding the PIC is substituted by the Nominative Island Condition (NIC), stated as follows:

A nominative anaphor cannot be free in \( \hat{S} \) (where the abstract Case Nominative is assigned by the feature \([+\text{Tense}]\))

The NIC rules out as ungrammatical tensed sentences in which the subject is a PRO, a reciprocal, a reflexive or the trace of NP, but not when it is the trace of a \( wh \)-phrase. Consider the following sentence:

\[
(6) \quad \text{which books did Alice believe } [\hat{s}[\text{COMP}_2][st_1 \text{ were out of print}]]
\]

Since \( wh \) movement applies from COMP to COMP, \( t_2 \) (the intermediate \( wh \)-trace) binds the nominative trace \( t_1 \) in \( \hat{S} \); \( t_1 \) is therefore not in violation of the NIC. \( t_2 \) might be in violation of the NIC, but since traces in intermediate COMPs are not considered to have Case, \( t_2 \) is not Nominative and consequently the NIC does not apply to it.

referred to as ACI constructions (accusativus cum infinitivo). Chomsky assumes that the NP following verbs like believe is the subject (with accusative case-marking) of the infinitive. ACI constructions differ therefore from other infinitivals in that they show a lexical subject in surface structure.

\(^5\) This is done by means of the so-called Case Filter that excludes structures containing lexical NPs not having case. Note that nominative case cannot be assigned to the subject of an infinitival since infinitivals are \([-\text{Tns}])\), and \([-\text{Tns}]\) does not assign any case.

\(^6\) In the appendix of On Binding a more formal account of free and bound is given that does not make use of the term coindexation. The reason was that the Disjoint Reference facts had to be incorporated.
A second point that we wish to make concerning the development of the theory of anaphora within EST is the following. The program in *Conditions on Transformations* was intended to elucidate unitary phenomena concerning anaphors. However it turned out that it was necessary to distinguish different types of anaphors with different properties. So, in *Conditions on Transformations* we find reciprocals and reflexives as lexical anaphors and trace as the only non-lexical anaphor. Both lexical and non-lexical anaphors are considered to fall under the same conditions. Later, as a consequence of the elaboration of the notion of Specified Subject and the properties of control in infinitival clauses, the empty category PRO was introduced with properties of its own. In *On Binding* a formal distinction was also made between the trace of NP and the trace of a *wh*-phrase: the trace of *wh* was marked with a feature [±COMP] so that in LF the *wh*-trace could be interpreted as a variable. Also it was suggested that the trace of NP and the trace of *wh* act differently as far as the Opacity condition was concerned, but not with respect to the NTC. In the government-binding theory *wh*-traces differ from NP-traces in that the former have Case and different binding conditions apply to them.

This brings us to the last point in this section, the problem of the theoretical terms in which to state the domain of anaphoric relationships. A demarcation line may be drawn between the work before *On Binding* and the work that started with *On Binding*. In the earlier work, Chomsky tried to define ‘islands’, out of which no element could be moved, or where no element could be linked to an external antecedent; these conditions were formulated as two-position constraints. In the later work the binding conditions are conditions on LF and formulated as constraints on only one position. Note that this step made it possible to account for PROs with arbitrary reference as in sentences like (7)

(7) It is unclear [\(\tilde{s}\) what [\(s\) PRO to do]]

While PRO has the properties of bound anaphora, there is nothing outside the S for this PRO to be linked to.

Summarizing, in the earlier work it is the structural relationship between antecedent and anaphor that counts, while in the binding theories the emphasis is on properties of LF.

III. *Pisa: Government and Binding*

As mentioned before, in the government-binding system (GB) the T-model is presupposed. This means that there is a base that
generates base-structures, followed by a transformational rule 'Move \( \alpha \)', which generates S-structures. These S-structures are mapped onto Phonetic Representation (the left side of the T-model) and onto Logical Form (the right side).

**Base**

The base consists of rules that have the following general form

\[
(1) \quad X^n \rightarrow \ldots \ X^{n-1} \ldots
\]

It is assumed that at least as far as the lowest rule (2) is concerned,

\[
(2) \quad X^1 \rightarrow \ldots \ X \ldots
\]

the «...» is fixed through all categories. That is to say that all instances of \( X \) (V, N, A, P)\(^8\) have the same complement structure. This implies for instance that every lexical category allows an NP-complement. So the base rules generate the following structures:

\[
(3) \quad V - NP \quad \ldots \text{see him} \ldots
\]

\[
(4) \quad P - NP \quad \ldots \text{with him} \ldots
\]

\[
(5a) \quad A - NP \quad \ldots \text{proud him} \ldots \quad \text{b.} \quad \ldots \text{proud of him} \ldots
\]

\[
(6a) \quad N - NP \quad \ldots \text{writer the book} \ldots \text{b.} \quad \ldots \text{writer of the book} \ldots
\]

In general, only P and V have NP-complements. In this system the ungrammaticality of (5)a and (6)a is not accounted for by a restriction on the base rules but by Case Theory (Rouveret & Vergnaud, 1980). Assuming that only P and V ([\(-N\)]) are case-assigners, it follows that only NP-complements of V and P receive case in the normal fashion. In order to account for the ungrammaticality of (5)a and (6)a, it is assumed that there is a filter on the left side of the grammar which tells us that every lexical NP must have case:

\[
(7) \quad *[_{NP \text{ phonetic matrix}}] \quad \text{if NP has no case}
\]

To save the generalization that every lexical category has the

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\(^7\) These rules belong to some version of the X-bar theory.

\(^8\) These lexical categories can be classified by making use of the features \([\pm N]\) and \([\pm V]\), where \([+N, -V]\) is noun, \([-N, +V]\) is verb, \([+N, +V]\) is adjective and \([-N, -V]\) is preposition.
same complement structure, we consider (5)b and (6)b to be the result of the introduction of case-markers in the structures of (5)a and (6)a. In English the preposition of is used for this purpose. This preposition has no lexical content in these cases, only a syntactic function.

For languages like English, Dutch, French and Italian, the following base-rules are assumed:

\[
\begin{align*}
(8) & \quad i \; S \rightarrow \text{COMP - S} \\
     & \quad ii \; S \rightarrow \text{NP - INFL - VP} \\
     & \quad iii \; \text{INFL} \rightarrow \left\{ \begin{array}{l}
+ \text{Tns} \\
- \text{Tns}
\end{array} \right\} - \text{AG}
\end{align*}
\]

INFL is the inflectional element which contains the tense marker [± Tns] and the agreement marker AG, which contains features like person, number, gender and case. Both AG and Tns end up very often on the verb. The AG position will play a prominent role in the GB system, since the language specific possibility of an index on AG accounts for the possible occurrence of null subjects.

The structure of COMP is supposedly as follows:

\[
(9) \quad [\text{COMP \; wh-phrase - \pm WH}]
\]

There are two positions in COMP, one for a \textit{wh}-phrase and another for a lexical complementizer, which at least in English, can be \textit{-WH} (\textit{that}, ...) or \textit{+WH} (\textit{whether}, ...). Since both positions cannot be (lexically) realized at the same time, in the Filters & Control framework (Chomsky & Lasnik, 1977) deletion in COMP of either the \textit{wh}-phrase or the complementizer is governed by a prohibition against double-filled COMP nodes, while in the On Binding framework the emphasis is put on the deletion of \textit{wh}-phrases in COMP up to recoverability\(^9\). A further step, which is taken in the GB framework, is to eliminate the deletion-in-COMP rule\(^10\) and to propose instead an optional expansion of COMP.

\textit{Government}

Since Case is a rather crucial notion in this theory, a structural notion has to be defined which determines under which conditions

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\(^9\) Recoverability is a condition on deletion rules, which says that deleted items should be recoverable from the resulting structure.

\(^10\) Except for deletion of non-case-marked traces in COMP, as we will discuss later.
something can be assigned Case by something else. 'Government' is one of the central notions in this framework.

(10) \textit{Government}^{11}: \alpha \text{ governs } \beta \text{ iff } \alpha \text{ minimally c-commands } \beta

(11) \textit{Minimal c-command}: \alpha \text{ minimally c-commands } \beta \text{ iff }
1) \alpha \text{ c-commands } \beta
2) \text{ there is no } \gamma \text{ such that}
   a) \alpha \text{ c-commands } \gamma
   b) \gamma \text{ c-commands } \beta
   c) \text{ and not } \gamma \text{ c-commands } \alpha

Before explaining the consequences of this definition, we have to determine which categories can be considered as \( \alpha \), \( \beta \) and \( \gamma \). For \( \alpha \) and \( \gamma \) we have to add to the definitions (10) and (11) that they have to belong to a lexical category \( (A, N, V \text{ or } P) \).

(12) \( \alpha/\gamma = [\pm N, \pm V] \)

For \( \beta \) no such restriction is necessary. Roughly the consequences are that sister nodes of a lexical category are governed by that lexical category\(^{12} \). Let us illustrate this with an example:

(13)

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          VP
          /\    \\
         V    NP_1  PP
           /\    /\   /\  \
          P  NP_2 P  NP_2
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In tree-structure (13) the V governs \( NP_1 \), because V — a lexical category and consequently a governor — c-commands \( NP_1 \) and the only possible \( \gamma \) in this structure, P, does not fulfill the conditions of (11, 2b): \( P(\gamma) \) does not c-command \( NP_1 \) (\( \beta \)). So V governs \( NP_1 \). V does not govern \( NP_2 \), because in this configuration there is a \( \gamma \). P fulfills all the conditions of (11, 2): \( V(\alpha) \text{ c-commands } P(\gamma) \), P c-commands \( NP_2(\beta) \) and it is not the case that P c-commands V. So although V c-commands \( NP_2 \) it does not minimally c-command this node. In the same way as \( NP_1 \) is governed by V, \( NP_2 \) is governed by \( P \).

\(^{11}\) As is the case with all definitions given here, this is the definition as it was formulated by Chomsky at the Workshop in Pisa, April 1980.

\(^{12}\) The notion of Government expresses a kind of local control.
The next step is to make case-assignment dependent on Government. This can be done by saying that an NP receives case from its governor. This works fine for objects verbs and prepositions, but the problem is to assign nominative case to a subject. As can be seen from (14) the subject is not governed by a category of the type \([ \pm N, \pm V]\):

\[
\begin{array}{c}
\text{S} \\
\text{COMP} \\
\text{NP} \quad \text{INFL} \quad \text{VP}
\end{array}
\]

(14)

We can solve this problem by including \([ + \text{Tns}]\) in the set of possible governors (12). This would make the subject governed and nominative in case of a tensed clause. Chomsky proposes however that it is not necessary to do so. He argues that we can drop \([ + \text{Tns}]\) government by saying that nominative case on the subject is a property of certain types of structures, namely tensed clauses.

It is clear that the notion of Government is closely related to strict subcategorization. In a structure like (13) the Verb can be subcategorized for NP\(_1\) and PP, but certainly not for NP\(_2\), just as NP\(_1\) and PP but not NP\(_2\) are governed by V.

So we can give the notion of Government more content by observing that Government determines the structural domain in which subcategorization takes place.

There is one more problem with the definition as it is stated now. In both of the following configurations the NP\(_1\) is governed by V:

(15) \[\text{NP V}[\text{S} \quad \text{NP}_1 \quad \text{to VP}]\]  
     \[\text{I promised } [\text{S} \quad \text{PRO to go home}]\]

(16) \[\text{NP V}\quad [\text{NP}_1 \quad \text{X}]\]  
     \[\text{I saw } [\text{NP}_1 \quad \text{John's new car}]\]

In (15) and (16) the V c-commands NP\(_1\) and there is no \(\gamma\), so V governs NP\(_1\) by definition. Still there can be no case-marking dependent on V, because the subject of infinitivals has no case and the case of NP\(_1\) in (16) is determined within NP and not by V. To prevent Government from going down into an NP or S, we have to add to the definition of Government that there can be no S or NP
bracket between $\alpha$ and $\beta$, i.e. $S$ and NP are absolute barriers for Government. From this it follows that the subject of an infinitival clause cannot get case and hence cannot be lexical because of the Case Filter (7).

There are however cases where the subject of an infinitive gets case:

(17) I believe [s him to go home]

To account for this type of construction, which we will call from now on ACI-construction, Chomsky proposes a rule of $S$-deletion, which is triggered by lexical properties of the main verb. If $S$ is deleted the matrix verb does govern the subject and assigns objective case to the embedded subject. As we will discuss later, this rule of $S$-deletion is also applied in Raising constructions like (18).

(18) Johni seems [s ti to go home]

As we have seen in most cases the case of an NP is determined by the governor of that NP. Now we need a rule to specify which case is assigned. For the rule that assigns nominative case there are two options:

(19) $NP \rightarrow$ nominative if governed by $+Tns$

or:

(20) $NP \rightarrow$ nominative if NP is the subject of a tensed clause

Other rules are:

(21) $NP \rightarrow$ objective if governed by $[-N]$ (i.e. P or V)
(22) $NP \rightarrow$ inherently case-marked elsewhere\(^{13}\)
(23) $NP \rightarrow$ genitive in [NP NP - X]

Although this is not necessarily so, Chomsky assumes that case-marking takes place at the level of S-structure, after move $\alpha$. This explains why the subject of a passive sentence has nominative case, although it has been moved from object position. In the case of $wh$-movement, it is necessary to assume an additional principle which tells us that a moved $wh$-phrase inherits its case from its

\(^{13}\) Inherent case-marking is case-marking determined by idiosyncratic properties of $[-N]$. Examples are the dative of indirect objects or genitive objects in German.
trace. This is necessary since COMP, the landing site of the \textit{wh}-phrase, is not a position to which case is assigned and a lexical NP has to have case in order not to violate the Case Filter. Furthermore it is clear from languages with an overt case system like German, that the phrase moved by \textit{wh}-movement retains the case of its base position:

(24) Wer (nom) hat ihn gesehen
(25) Wen (acc) habe ich gesehen
(26) Wem (dat) habe ich das Buch gegeben

In the case of NP-movement\textsuperscript{14} this principle of inheritance of case creates a problem because the moved NP would receive case twice, once from its surface position and once by inheritance from its base position. This conflicting situation is resolved in this system by assuming that both the object of a passive participle and the embedded subject in a Raising construction are governed but not case-marked. Therefore the moved NP can only receive case in its surface position. Furthermore it makes NP-movement obligatory. Suppose the object of a passive were not moved, then it would not receive case and would be filtered out by the Case Filter\textsuperscript{15}.

(27) \text{[NP\text{e}][[-v] en [v kill]]} John \quad \text{(base structure)}
John\text{[nom]} was killed \text{[t[-case]} \quad \text{(S-structure)}

The same situation arises in Raising constructions. As we have mentioned before, in Raising constructions S-deletion applies and consequently the embedded subject is governed by the matrix verb. But unlike in ACI-constructions, in Raising there is no exceptional case-marking\textsuperscript{16}, so the subject is not case-marked and has to be moved to prevent the sentence from being excluded by the Case Filter:

(28) \text{[NP\text{e}]} seems [s John to go home]
John\text{[nom]} seems [s t[-case} to go home]

\textsuperscript{14} The relevant instances of NP movement are Passive and Raising.
\textsuperscript{15} If the passive participle has two objects, one of them receives case by inherent case-marking. Otherwise a sentence like ‘He was given a book’ would be ruled out.
\textsuperscript{16} If there is exceptional case-marking on the subject of an embedded clause by the matrix verb, this case-marking is dependent on idiosyncratic properties of the verb. So somewhere in the lexicon it is stated that a verb like believe assigns case to an embedded subject if it governs that subject.
Notice that in this system it is possible to make a principled distinction between traces of NP-movement and traces of *wh*-movement on the basis of case. Extending this idea by making a generalization over *wh*-traces, traces left behind by the Quantifier Rule\(^\text{17}\) and traces in Focus constructions\(^\text{18}\) on the one hand and traces of NP and PRO on the other, case can be used as a distinction between variables and non-variables, where a variable is defined as an empty element bound by an appropriate operator\(^\text{19}\). So we can say that \([_{\text{NPe}}]\) is a variable if and only if it is case-marked\(^\text{20}\). This distinction between variables and non-variables is furthermore motivated by the fact that bound variables behave like names with respect to anaphora. This can be seen from the so-called strong cross-over cases (cf. Wasow, 1979):

\begin{align*}
(29) & \text{Who}_i \text{ did he say } [\text{Mary kissed } t_i] \\
& \quad (\text{he said that Mary kissed John}) \\
(30) & \text{Who}_i \text{ did he say } [t_i \text{ had won}] \\
& \quad (\text{he said that John had won}) \\
\end{align*}

In both cases the variable \((t_i)\), just like a name, cannot be interpreted as coreferential with the pronoun *he*, contrary to (31)

\begin{align*}
(31) & \text{Who}_i t_i \text{ thinks that he will win} \\
& \quad (\text{John thinks that he will win}) \\
\end{align*}

On the other hand non-variables like PRO and NP-trace can and sometimes must be interpreted as coreferential with a c-commanding NP in argument position:

\begin{align*}
(32) & \text{He}_i \text{ promised } [\text{PRO}_i \text{ to go home}] \\
(33) & \text{He}_i \text{ seemed } [t_i \text{ to go home}] \\
\end{align*}

\(^\text{17}\) The Quantifier Rule (May, 1977) is a rule at the level of Logical Form, which adjoins quantified noun phrases to S, in order to derive the correct interpretation with respect to scope. It is assumed that the traces of QR are variables bound by an operator, the quantified NP.

\(^\text{18}\) It is assumed that Focus constructions like ‘JOHN saw Bill’ have a Logical Form representation like ‘the x such that (x saw Bill) is John’.

\(^\text{19}\) In this theory there are two types of boundness. The first, which is the one meant here, is equivalent with ‘coindexed with a c-commanding phrase’. The second, which is relevant for the Binding Theory, is ‘argument-bound’, which means coindexed with a c-commanding NP in argument position.

\(^\text{20}\) It is not necessarily the case that if \([_{\text{NPe}}]\) is case-marked, it is a variable.
Two indexing procedures apply to NP: coin-indexing by movement (if some NP is moved the moved NP and its trace have the same index) and a free indexing procedure, as a consequence of which in a sentence like (34)

(34) John thinks that he saw Mary

he can accidentally have the same index as John, in which case there is coreference and the pronoun is called proximate, or he can have a different index in which case there is no coreference and the pronoun is called obviative.

At the level of S-structure there are four types of NP:

— **anaphors**: NPs that are lexically identified as anaphor instances are: reflexives, reciprocals and bound idioms as 'he lost his way' ('I lost his way')

— **pronominals**: this class can be subdivided into two types:

  - *pronouns*, pronominals with features and a phonetic matrix
  - *PRO*, pronominals with features and without a phonetic matrix

  — other lexical NPs

— **traces**: to be subdivided into *wh*-traces and NP-traces

**Binding**

As we have seen the notion Government plays an important role in this framework for determining the structural possibilities of assigning case to NPs. In the binding theory Government plays a crucial role too, since the domain in which Government takes place determines the domain of binding possibilities of the different types of NPs. The domain in which a category is governed is some category that contains both governor and governor. This category is called Governing Category and is defined as follows:

(35) \( \alpha \) is a governing category for \( \beta \) iff there is some category \( \gamma \) such that \( \gamma \) governs \( \beta \) and \( \alpha \) contains \( \gamma \)

21 Contrary to *On Binding* and earlier work, PRO is not considered to be empty. It is just like a pronoun, but without a phonetic matrix. It has the same insertion possibilities as pronouns, and control is comparable to interpretation of pronouns. The reason for doing this will become clear from the Binding Theory.
In order to account for the binding relations, we need to specify which categories are possible Governing Categories and we have to define the Minimal Governing Category. Chomsky takes NP and S to be the possible Governing Categories. The Minimal Governing Category (MGC) is defined in the following way:

(36) \( \alpha \) is a minimal governing category for \( \beta \) iff \( \alpha \) is a governing category for \( \beta \) which properly contains no other governing category for \( \beta \).

The Theory of Binding consists of three principles:

(37) A: If \( \alpha \) is an anaphor or has no phonetic matrix, then
   1) it is a variable
   or 2) it is bound in every governing category.

B: If NP is case-marked, then
   1) it is an anaphor
   or 2) it has to be free in every governing category.

C: If \( \alpha \) is pronominal, then
   it is free in every minimal governing category (cf. note 24).

Notice that in this theory bound/free does not mean coindexed/non-coindexed, but it means argument bound/free. Something is argument-bound if it is coindexed with a c-commanding argument, an NP in one of the main NP positions in a sentence (subject, object, indirect object).

Before illustrating how these principles work, we want to show that from them it follows that PRO is ungoverned and that NP-traces are not case-marked. Suppose PRO were governed, then there is

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22 The evidence for choosing S, and not S, as Governing Category is not very strong. A possible argument could come from the analysis of for-infinitivals. Given the fact that in (i) they and each other can be coindexed, they has to be an argument within the Minimal Governing Category of each other (Binding Theory, A2). This can only be the case if S is the Governing Category and not S. Each other, the embedded subject, is governed by the complementizer for; if S is the Governing Category, the matrix S is the MGC, if S is the GC, then the embedded S is the MGC and consequently each other is not bound in its MGC.

(i) They wanted very much [_S for] [_S each other to win the race].

23 Categories with no phonetic matrix are traces (NP and who) and PRO.

24 Including the Minimal Governing Category. PRO trivially fulfills this requirement since PRO is not governed and hence it has no governing category.

25 From B we have to exclude case-marked pronouns.

26 PRO or pronoun.
a minimal governing category \( \alpha \) in which PRO is governed. Following A PRO must be bound in \( \alpha \) and following C PRO must be free in \( \alpha \). Given this contradiction we can conclude that PRO is not governed and consequently trivially fulfills A2 and C.

For NP-traces the same line of argumentation is possible. Suppose NP-traces are case-marked, then an NP-trace is either an anaphor of free in every governing category (B). Since an NP-trace is always bound (argument bound) in its minimal governing category (A), it has to be an anaphor; but it cannot be an anaphor by definition. Therefore it cannot be case-marked.

Now let us see what happens in the various cases:

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**PRO in \( S \)**

As should be clear from the foregoing, at the level of Logical Form, where the Binding Theory applies, PRO has to be ungoverned. The standard position for PRO is consequently the subject position of an infinitival clause:

\[(38) \ [s [s \text{ PRO to VP}]]\]

This situation occurs in cases of indirect questions and control:

\[(39) \ \text{John asked [what [PRO to do]]}\]
\[(40) \ \text{John promised her [[PRO to go home]]}\]
\[(41) \ \text{John persuaded Mary [[PRO to go home]]}\]
\[(42) \ \text{It is impossible [[PRO to win\textsuperscript{27}]]}\]

In (39)-(42) PRO is neither governed nor case-marked. Because it is not governed PRO has no governing category and therefore it fulfills binding principles A2 and C. In sentences where \( \tilde{s} \)-deletion has been applied, i.e. Raising and ACI constructions, PRO is not allowed, since in these cases the matrix verb or adjective governs the subject of the embedded infinitival clause:

\[(43) \ \text{John\textsubscript{i} is certain [s t\textsubscript{i} to go home]}\]
\[(44) \ *\text{it is certain [s PRO to go home]}\]
\[(45) \ \text{John believes [s him to be sick]}\]

\textsuperscript{27} Just as pronouns, PRO can be proximate, controlled by an argument outside its MGC, or obviative as in (42). Obviative PRO is what was previously called arbitrary PRO or PRO\textsubscript{arb}.\]
(46) *John believes [s PRO to be sick]

So at least at the level of Logical Form, the occurrence of PRO in subject position of S is restricted to the subject position of infinitival clauses without S-deletion.

— PRO in NP

A more complicated situation arises in cases where PRO is in the determiner position of an NP like in (47):

(47) John prefers [NP PRO writing books]

Notice first that PRO is not allowed if it is followed by an N:

(48) *John likes [NP PRO's book]

Lexical NPs are allowed in this configuration:

(49) John likes Mary's book
(50) John likes my book
(51) John likes his book

Since in general lexical NPs have to be governed in order to get case, we will assume that there is a rule which introduces a category Poss(essive) that functions as a governor and a case-assigner. The rule will have following form:

(52) NP \rightarrow [NP NP+Poss]/___N

From this rule it follows that PRO cannot occur in this configuration since it would be governed (and case-marked) by Poss. If the determiner is followed by V instead of N, the situation is different. PRO and lexical NP seem not to be in complementary distribution as in all the other cases:

(53) John prefers my writing the book
(54) John prefers his writing a book
(55) John prefers PRO writing a book

\(^{28}\) *his can be interpreted as a proximate or as a obviative pronoun.
This problem can be solved by assuming that rule (52) is obligatory in the context N and optional in the context V. If the rule has been applied PRO is impossible because it would be governed, but if the rule is not applied PRO is the only possibility, since the NP is neither governed nor case-marked.

Notice that there is an interesting difference between the pronoun his in (51) and the pronoun his in (54). In (51) there is no disjoint reference, his can be obviative or proximate; in (54) however there is disjoint reference between John and his and his has to be obviative. Chomsky argues that we need a principle which states that if you can use PRO, don’t use a pronoun. This ‘avoid pronoun principle’\(^{29}\) accounts for the disjoint reference in (54) and makes it possible to maintain the idea of complementary distribution between PRO and lexical NPs.

The same principle can be observed in for + infinitive constructions. In (56) disjoint reference between John and him is strongly preferred:

(56) John bought a book [for him to read]

(57) John bought a book [PRO to read]

— pronouns

Disjoint reference with pronouns follows from the Binding Theory. According to principle C, pronouns have to be free in their minimal governing category\(^{30}\).

So in (58) the pronoun cannot be interpreted as coreferential with John, while it can in (59)

(58) John saw him
    John counted on him
    I liked John’s picture of him

(59) John believed that he would win
    John saw my picture of him
    John liked his picture of me

The same situation as in (58) arises in ACI constructions with exceptional case-marking. The embedded subject which is governed and case-marked by the matrix verb cannot be coreferential with the

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\(^{29}\) Maybe it is better to call this principle ‘avoid proximate pronoun’.

\(^{30}\) Famous counterexamples are sentences like ‘John\(_i\) saw a snake near him\(_i\)’.
matrix subject, because it would be bound within its minimal governing category.

(60) *[s John\textsubscript{i} believes [s him\textsubscript{i} to be a fool]]

For the same reason lexical anaphors are possible as subjects of infinitival clauses in ACI constructions. Lexical anaphors have to be bound in every, including the minimal governing category and since in this construction the matrix S is the minimal governing category, they can be coreferential with the matrix subject.

(61) *[s They\textsubscript{i} believe [s each other\textsubscript{i} to be fools]]

--- lexical items

According to binding principle B2, lexical items have to be free in every governing category.

(62) *John\textsubscript{i} saw John\textsubscript{i}
    *John\textsubscript{i} said that Mary thought that I believed that John\textsubscript{i} was a fool

--- variables

A case-marked trace is a variable and has to be bound by an appropriate operator. It cannot be bound by an argument according to the binding theory, because it has to be free in every governing category (B2). Therefore it follows that it is impossible to move a phrase from a case-marked position to an argument position, as is shown in (63)

(63) *John\textsubscript{i} saw t\textsubscript{i}

Furthermore it is impossible to move from COMP to an argument position, because a variable has to be free in every governing category.

(64) *[s[COMP][s ... NP\textsubscript{i} ... [s[COMP t\textsubscript{i}][s ... vbl\textsubscript{i} ...]]]]

So COMP-to-COMP movement does not need to be stipulated; it follows from the binding theory.

Another principle that falls out nicely is that a pronoun can be bound by a quantifier just in case replacing that quantifier by a name gives you a possible case of non-disjoint reference:
(65) Who_{i} thinks that he_{i} will win  
Everyone_{i} thinks that he_{i} will win  
John_{i} thinks that he_{i} will win  

(66) *Who_{i} saw him_{i}  
*Everyone_{i} saw him_{i}  
*John_{i} saw him_{i}  

(67) *He_{i} saw who_{i}  
*He_{i} saw everyone_{i}  
*He_{i} saw John_{i}  

In (65) the pronoun can be bound by the quantifier and no principle of the binding theory is violated. In (66) and (67) this is impossible, since in (66) the pronoun *him should be free in its minimal governing category (C) and in (67) the trace left from the Quantifier rule (at LF) should be free because it is a variable (B2). As we have said before, the strong cross-over facts fall out too:

(68) *Who_{i} did he_{i} say Mary kissed t_{i}  

The trace in (68) is a variable and should be free in every governing category, so coindexation between he and the variable is impossible.

— *trace of NP*

The two rules here considered as instances of NP movement are Passive and Raising:

(69) John_{i} was killed t_{i}  
(70) John_{i} seems [s t_{i} to be sick]  

In both cases the trace is bound in its minimal governing category; in (70) because after S-deletion the matrix verb governs the embedded subject and hence the matrix S is the minimal governing category for the trace.

If the trace were to have case, it would be a variable and both sentences would be ruled out by B2. Therefore we can conclude that the notion of Government is wider than that of case-marking. Although the traces in (69) and (70) are governed by kill and seem respectively, they are not case-marked, given the assumption that passive participles do not assign case and that seem is not a verb
that triggers exceptional case-marking after $\delta$-deletion (as is the case with *believe*). According to principle A2, non-case-marked traces (non-variables) have to be bound within every governing category, and this is the correct result for (69) and (70).

**Empty Category Principle (ECP)**

As was implicitly shown in the preceding paragraph, in general Opacity and the Nominative Island Condition follow from the Binding Theory. They form in a sense theorems in this theory. There is however a difference in that in this framework variables are free from any effect of Opacity and NIC, since the only thing the Binding Theory tells us about variables is that they have to be free in every governing category. The effect of NIC and Opacity is accounted for in this theory by the Binding Theory as far as anaphors, pronominals, lexical items and NP-traces are concerned. Now one major problem is left. In *On Binding* the ungrammaticality of a nominative trace in subject position, which is not bound within its $\delta$, is accounted for by the NIC, which says that a nominative trace has to be bound within $\delta$ (cf. 71).

(71) *Who$_i$ do you wonder [how well [t, saw Bill]]

In this theory we have to look for another explanation, since the Binding Theory tells us that a case-marked trace is a variable and has to be argument free. If we were to integrate the explanation of these facts in the Binding Theory we would have to say that a variable is not always free, a position which would make us lose a number of generalizations, for instance with respect to accounting for the cross-over cases (29 & 30) and COMP-to-COMP movement (64). Other reasons for considering *wh*-traces as variables and explaining facts like (71) by an additional principle, are that in the former frameworks *wh*-traces had to be free from SSC, since *wh*-phrases can be moved from object position over a specified subject, but not from the NIC (71), and that there are languages, like Italian, where *wh*-traces do not fall under the NIC, as can be seen from (72)

(72) Chi$_i$ credi [che [t$_i$, verrà a visitarci]]

So apparently it is better to maintain the position that as far as the Binding Theory is concerned, *wh*-traces are variables and to

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explain the ungrammaticality of sentences like (71) by another principle, which we can call for the time being the Residue of NIC (RESNIC), since all effects of NIC are accounted for by the Binding Theory except for this one.

RESNIC has to deal with the fact that nominative traces have to bound (not argument bound) within \( \bar{S} \). Furthermore it has to allow an explanation for the Italian cases, where a nominative trace can apparently be free. If we concentrate on the Italian facts first, we can observe a correlation between the possibility of apparently unbound nominative traces and the possibility of phonetically null subjects in tensed clauses and free subjects inversion:

(73)  
  a. Verrà  
    He will come  
  b. *Will come

(74)  
  a. Verrà Gianni  
    John will come  
  b. *Will come John

(75)  
  a. Chi credi che verrà?  
    Who do you believe will come?  
  b. *Who do you believe that will come?

These examples have in common an empty subject position in a tensed clause. Suppose the RESNIC is formulated in such a way that a nominative empty NP has to be bound in \( \bar{S} \), where bound means coindexed and not argument bound,

(76) RESNIC: [\( NP_{nom} \)] cannot be free in \( \bar{S} \)

then an explanation is provided for the English cases, but the Italian cases still remain counterexamples, because in (73a), (74a) \(^{31}\) and (75a) the subject is free in \( \bar{S} \). Chomsky proposes to introduce a parameter to account for the differences between these languages, the so-called PRO-drop parameter. The parameter is that languages like Italian and Spanish have an index on the node Agreement (\( AG_{i} \)), which means that in these languages the subject can be coindexed with this node. By consequence the RESNIC, as formulated in (76), does not rule out sentences like (73a), (74a) and (75a), since the empty subject position is bound by AG. We will return to this parameter when the RESNIC is replaced by the Empty Cate-

\(^{31}\) In (74a) this is only the case if the moved subject does not c-command its trace. So it depends on the analysis of stylistic inversion.
gory Principle but first we will discuss the so-called *that*-trace phenomena. From (76) it is not immediately clear that a sentence like (77) is ungrammatical.

(77) *Who$_i$ does John think that t$_i$ saw Bill

The Binding Theory only tells us that the trace in subject position has to be argument free and RESNIC says that the trace has to be bound (coindexed with a c-commanding phrase) in $\bar{S}$. This can be done by assuming an intermediate trace, coindexed with the trace in subject position, in the embedded COMP:

(78) *Who$_i$ does John think [[t$_i$ that] [t$_i$ saw Bill]]

Chomsky argues that in order to account for these facts we need the independently motivated doubly filled COMP filter, as first stated in *Filters & Control* 32, with the extension that traces count for this filter 33:

(79) *[COMP $\alpha$ $\beta$], $\alpha$, $\beta$ are lexical or trace

It will be clear that now (78) is filtered out, since COMP contains both trace and *that*. (77), where there is no intermediate trace in COMP, is out given RESNIC. As we mentioned before, the expansion of COMP by the base rules is considered to be optional. If we do not generate a lexical complementizer in this sentence, the following sentence will be the result:

(80) Who$_i$ does John think [t$_i$ [t$_i$ saw Bill]]

Now filter (79) does not apply and the nominative trace is correctly bound in $\bar{S}$. Hence the sentence is grammatical. Now, what happens with *wh*-movement from object position, like in (81):

(81) Who$_i$ does John think [[t$_i$ that] [Bill saw t$_i$]]

Just as in (78) this sentence is ruled out by the doubly filled COMP filter. Still there is a surface form corresponding to (81). To

32 In *Filters & Control* this filter was formulated as in (ii)

(ii) *[COMP wh-phrase, $\varphi$], $\varphi \neq e$

33 Idea originally comes from a paper of David Pesetsky *‘COMP-Trace Phenomena, NIC and Doubly-Filled COMPs’* (1978).
account for this we have to assume that there is a rule which deletes non-case-marked traces in COMP. If we delete the trace in COMP the sentence will be grammatical, because traces in object position are not subject to RESNIC as formulated in (76). So RESNIC accounts for the asymmetry of subject- vs. object-traces. Since doubly filled COMP filter and RESNIC are independently motivated most of the 'that-trace facts' follow from the theory.

The relevant examples where a nominative empty category is not excluded by RESNIC are the cases where a nominative empty category is coindexed with a wb-phrase or trace in the adjacent COMP or where the subject is coindexed with AG, like in the Italian cases. So a nominative empty NP has to be locally controlled by a coindexed phrase. This brings us very close to the notion of Government, since this notion is defined as a kind of local control. If it is possible to extend the definition of Government in such a way that this local coindexing is part of it, then it will be possible to redefine RESNIC in a more coherent way. To do this, wb-phrases in COMP and AG have to be added to the class of possible governors, and the definition of Government has to be replaced by a new definition, which is called Proper Government.

(82) Proper Government
    \[ \alpha \text{ properly governs } \beta \iff \alpha \text{ governs } \beta \]
    and a. \( \alpha = [\pm N, \pm V] \)
    or b. is coindexed with \( \beta \)

Now we can redefine RESNIC in terms of proper government. This new principle is called the Empty Category Principle (ECP):

(83) ECP: \([_{NP_e}]\) must be properly governed

This principle takes care of the cases discussed in this section because an empty nominative NP has to be properly governed. It is not governed by a member of the category \([\pm N, \pm V]\), so it has to be coindexed with its governor. The only two possibilities are a wb-phrase or trace in COMP and AG, if it bears an index. Remark that the subject-object asymmetry is no longer stipulated in the definition of ECP, as it was in the definition of RESNIC, but follows from Proper Government. The last point concerns the PRO-drop parameter. As is clear from (84) and (85), together with

\[34\] It follows since empty NPs in object position are always governed by the verb, but empty NPs as subjects of tensed clauses are only properly governed if coindexed.
the assumption of an index on AG in Italian and Spanish, the empty subject in sentences where the subject is moved by *wh*-movement (75) or by stylistic inversion (74) is properly governed, since the trace is governed by and coindexed with AG. But what about sentences with a null subject, like (73)? There the subject is not a trace, because nothing has been moved. Chomsky argues that it must be a PRO. PRO is a pronominal and can be inserted freely in NP positions, just like pronouns. But if it is a PRO in Logical Form, the binding conditions will be violated, because PRO has to be ungoverned and it is governed and case-marked here, because it is a subject of a tensed clause. To account for this, it is proposed that there is a rule which changes PRO into an empty NP ([$\mathit{Np}\mathit{e}$]). This PRO-drop rule (84)

\[(84) \text{PRO}_i \rightarrow [\mathit{Np}\mathit{e}]\]

makes it possible to generalize over the three different cases of empty subjects in languages like Italian. The PRO-drop rule is supposed to be a language universal. However it can only be applied in languages with an index on AG, because otherwise the empty subject would not be coindexed and consequently not be properly governed, as required by the Empty Category Principle.

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