

## ON THE X' INVISIBILITY MYTH: ANALYZING RESTRICTIONS ON INTERMEDIATE PROJECTIONS\*

Gerardo Fernández-Salgueiro  
*National Taiwan Normal University*

### ABSTRACT

The X' Invisibility Principle claims that intermediate (X') levels of phrase structure are unavailable for syntactic computation (see especially Chomsky 1995). Evidence for this principle comes from the fact that X' constituents resist operations such as movement and ellipsis and cannot be used as segment fragments. In this paper I argue that this principle is problematic on both conceptual and empirical grounds. I claim that movement restrictions are readily accounted for by Extension and Chain Uniformity, while restrictions on ellipsis and sentence fragments can be explained in terms of selectional features and the nature of syntactic projections.

Key words: X' Invisibility, movement, ellipsis, sentence fragments, projection, selectional features.

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## 1. INTRODUCTION

Since at least the inception of the Minimalist Program, it has been assumed that intermediate levels of phrase structure are unavailable for syntactic computation, something that has been named the X' Invisibility Principle (see e.g., Chomsky 1995; Epstein et al. 1998; Uriagereka 1998).<sup>1</sup> There are empirical reasons to believe that such a principle may be part of the grammar. As can be seen in the English and Chinese examples below, while maximal (XP) projections can be moved (1-2), elided (3-4), and function as segment fragments (5), intermediate (X') constituents cannot:

- (1) a. [<sub>AP</sub> Too good to be true]<sub>i</sub> though it was t<sub>i</sub>, he nonetheless believed it  
 b. \*<sub>[A'</sub> Good to be true]<sub>i</sub> though it was [<sub>AP</sub> too t<sub>i</sub>], he nonetheless believed it

(from Uriagereka 1998)

- (2) a. [<sub>TP</sub> ta hui changge]<sub>i</sub> shi meiyoun xiangxin t<sub>i</sub> de  
 he can sing is nobody believe DE  
 b. \*<sub>[T'</sub> hui changge]<sub>i</sub> shi meiyoun xiangxin [<sub>TP</sub> ta t<sub>i</sub>] de  
 'What nobody believes is that he can sing'

- (3) a. He said he would do it but I do not think he will vP<do it>  
 b. \*He said he would do it but I do not think he T'<would do it>

- (4) a. [<sub>TP</sub> ta bu [<sub>T'</sub> xiang [<sub>VP</sub> changge]] danshi ta hui vP<changge>  
 he not want sing but he will  
 'He does not want to sing but he will'  
 b. \* [<sub>TP</sub> ta [<sub>T'</sub> hui [<sub>VP</sub> changge]] danshi meiyoun xiwang ta  
 he will sing but nobody wish he  
 T'<hui changge>  
 \*'He will sing but nobody wishes he T'<will sing>'

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<sup>1</sup> The X' Invisibility Principle is also discussed at length in Epstein and Seely (2006), where it is argued that chains cannot be defined under X' Invisibility.

- (5) - What will they do?   - [TP They will try to help]  
                                     - [<sub>VP</sub> Try to help]  
                                     - \*[\_T, will try to help]

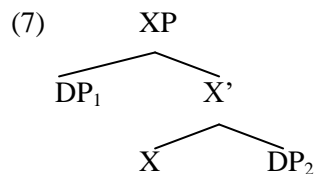
In this paper I argue that despite the evidence just presented, this X' Invisibility Principle is problematic, on both conceptual and empirical grounds. I will show that these restrictions are not the result of an overarching principle. Instead, I propose that each of them has their own independent (though sometimes related) explanation.

To begin with, this principle is very stipulative. Intermediate projections are actually syntactic terms (i.e., constituents), so there is in principle no reason to think that they cannot be visible to syntactic operations. In this respect, consider Chomsky's (1995) recursive definition of term in (6) below, which is followed by the clarification "terms correspond to nodes of the informal representations, where each node is understood to stand for the subtree of which it is the root":

- (6) For any structure K,  
    a) K is a term of K  
    b) if L is a term of K, then the members of the members of L are terms of K

In fact, intermediate projections are computed when calculating syntactic relations, for example (and most importantly, since it is the key syntactic relation), c-command.

To illustrate this, consider (7):



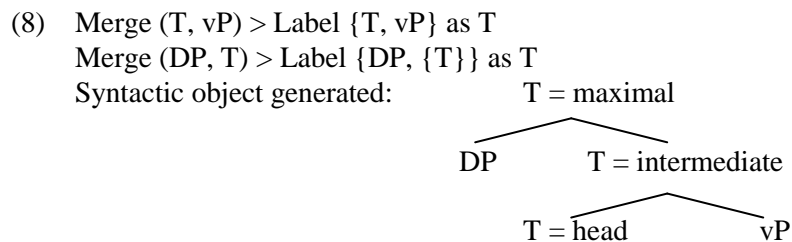
As can be seen in (7), DP<sub>1</sub> asymmetrically c-commands DP<sub>2</sub>. Crucially, the X' node has to be taken into account, otherwise the structure in (7) would be equivalent to a ternary branching structure with

respect to c-command:  $DP_1$  and  $DP_2$  would be predicted to c-command each other since the first node dominating  $DP_1$  would dominate  $DP_2$  and the first node dominating  $DP_2$  would dominate  $DP_1$ . This would of course lead to all sorts of empirical inadequacies regarding, for example, the subject/object asymmetry with respect to superiority, binding principles, and the distribution of negative polarity items. Moreover, X would be predicted to c-command  $DP_1$ , contrary to fact. We are thus compelled to assume that intermediate projections are visible when it comes to calculating c-command. Once we accept that intermediate projections are visible to the most basic syntactic relation, it becomes hard to explain why they are not visible for movement or ellipsis operations.

The strong derivational approach of Epstein et al. (1998) actually addresses this problem and argues that c-command is derivationally defined in terms of Merge operations. Under this approach,  $DP_2$  would never c-command  $DP_1$  because it never merged with  $DP_1$  or with a category containing  $DP_1$  in the course of the derivation, an explanation that I actually take to be on the right track. Notice, however, that this approach actually implies that intermediate projections are indeed visible, since they were *involved* in a Merge operation (for example, Merge ( $DP_1$ ,  $XP$ ) > [ $_{XP}DP_1$  [ $_{X'}X$   $DP_2$ ]]. Interestingly, Epstein et al. try to further motivate X' invisibility under their approach, an argument that has been criticized from the other side of the derivation vs. representation debate (see e.g. Brody 2002 for a thorough critique of the derivational definition of c-command and the stipulations needed to derive X' Invisibility under this approach). What is important for the purposes of the present study is that if the derivational approach to c-command is on the right track, its prediction is that intermediate levels should in principle be visible to the syntax, thus if my proposal is on the right track, Epstein et al.'s attempt to derive X' Invisibility may be unnecessary.

It is also relevant to consider whether more recent research in the Minimalist Program on the phenomenon of projection and labeling affects our understanding of the properties of intermediate projections (Chomsky 2013; Rizzi 2013, among others). If these new ideas are on the right track, we do have a principled reason why Merge never yields an intermediate constituent, that is, an object labeled as X' (see Chomsky

2013 for details on the labeling algorithm). However, when a subsequent operation of Merge applies that is labeled with the same category, three levels of projection are necessarily generated (corresponding to maximal, intermediate, and head levels in previous approaches). This is illustrated in the derivation in (8) below:



As can be seen in this derivation, no T' label is generated in the representation. Notice, however, that three levels of a T category are still present. It seems then that the labeling issue discussed in current research is orthogonal to the question of why out of those three levels of a projection of T, only the “second” (intermediate) level resists certain syntactic operations (recall (2-4) above, for example). See section 3 for further discussion on projection.

I would also like to note that all of the above should not be considered a merely conceptual or theory-internal discussion; serious inquiry should be clear with respect to the nature of the principles proposed and their domain of application. Since the existence of a certain principle is coupled with a set of predictions, studying possible contradictions or the unclarity of a principle is *also* an empirical matter. This is expressed very clearly in Epstein and Seely (2006:4), who write:

“To the extent that a principle is unclear, *its predictive content is unspecified*, hence indeterminate. Thus unclarity is an *empirical* issue...” (my emphasis, GF-S)

Another problem for the X' Invisibility principle is the fact that intermediate projections can be coordinated, which I think constitutes empirical evidence against this principle:<sup>2</sup>

(9) [TP John [T<sub>has</sub> left the company] and [T<sub>is</sub> in New York now]]

(10) [CP No other friend [C<sub>can</sub> I count on] or [C<sub>would</sub> I trust]]

Coordination is obviously a complex syntactic phenomenon and there have been numerous attempts at providing an elegant analysis of coordinate structures, the most salient of which are the X' analysis and the adjunction analysis (see e.g. Fernández-Salgueiro 2008 and Zhang 2010 for an overview of this topic). Whatever analysis of coordination we adopt, the syntactic rule for coordination must necessarily refer to the level of projection it applies to in its structural description, in this case, the X' constituent.

Even though we have just seen that coordination phenomena seem to provide empirical evidence that intermediate projections are indeed visible in the syntax, we still need to account for why they cannot be moved, elided, or function as segment fragments. This is what I attempt to do below.

## 2. MOVEMENT

The first restriction related to intermediate projections that I am going to consider here is the ban on movement. Unlike heads (X<sup>0</sup>s) and maximal projections (XPs), which can be moved, X' constituents cannot undergo movement operations. This contrast is illustrated again in the

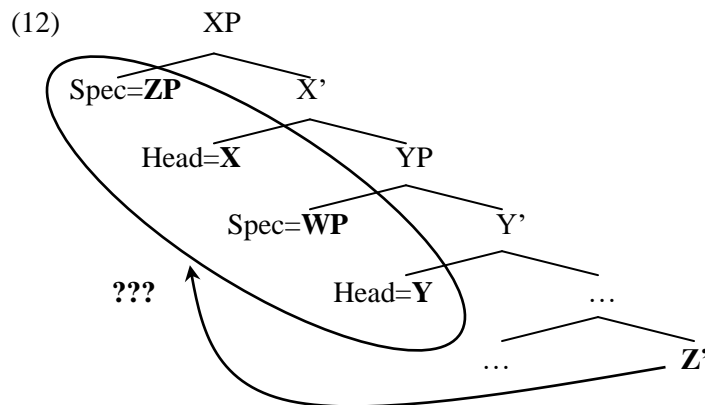
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<sup>2</sup> Here I am assuming a very standard analysis of these cases. In his study of the structure of the Left Periphery, Rizzi (1997) argues that examples like these involve coordination of AspP and CP, respectively. As for (9), however, the fact that a sentence like *John will have finished his thesis* (where *will* is the Tense head and *have* is the Asp head) can be coordinated with a conjunct that also includes Tense (*By next month, John will have finished his thesis and will actually take a year off*) seems to suggest that coordination at a higher level than AspP is at stake.

though-movement example in (1) above, repeated here as (11) (see Uriagereka 1998):

- (11) a. [AP Too good to be true]<sub>i</sub> though it was t<sub>i</sub>, he nonetheless believed it  
 b. \*[A' Good to be true]<sub>i</sub> though it was [AP too t<sub>i</sub>], he nonetheless believed it

This restriction has a relatively simple explanation provided Chomsky's (1995) Chain Uniformity Condition (CUC). Under the CUC, all links of a movement chain have to be isomorphic with respect to phrase structure status. Thus, heads have to move to head positions and maximal projections have to move to specifier positions. X' constituents, therefore, can never find a landing site for movement that will not incur in a CUC violation. This is illustrated in (12) below:



Given the CUC then, intermediate projections would only be able to move to X' positions. These, however, are never landing sites for movement given the geometry of phrase structure and the nature of the structure building operations Merge and Move, as can be seen above.

Moreover, under minimalist assumptions, X' constituents are never root syntactic objects; they only emerge as subsequent operations of Merge apply. Thus, any operation of movement to an X' position would need to target a position other than the root of the tree, which in

Minimalism is ruled out by the Extension Condition (see Chomsky 1995). In more recent work, Chomsky (2005) has revised this condition and dubbed it the No Tampering Condition.

In sum, X' constituents are unable to move because they either violate the CUC or the Extension/No Tampering Condition. Since these two principles are independently motivated, movement restrictions on X' constituents do not provide evidence for an X' Invisibility Principle. Deeper theoretical questions arise regarding the issue of whether these principles prevent the actual movement operation from taking place (a derivational view) or they just sanction the derived representation (a more representational view). Interesting as these questions are, they lie outside the scope of the present article.

### **3. SENTENCE FRAGMENTS**

Traditionally, the clause has been considered the basic unit of syntactic structure. Under minimalist assumptions, however, a clause is just the result of a head (Tense or Comp) projecting, in the same way that a DP is the projection of a D head or a VP is the projection of a V head (see Fortin 2007 and references therein for discussion). Many different XPs can in fact be used in isolation, for example, when we use them as an answer to a question. Constituents used in isolation are often referred to as non-sententials or sentence fragments.

It makes sense to assume that intermediate projections cannot function as sentence fragments because they are somehow incomplete. The question is how to define the notion of 'incomplete.'

In Minimalism, projection levels are defined derivationally. A maximal projection is a phrase that does not project any further, while the rest of the levels of projection, except the head level, are intermediate levels (X's). This means that we can't appeal to the maximal (XP) vs. intermediate (X') distinction to explain why certain syntactic objects can appear in isolation while others can't (recall (5) above). I believe that we can reformulate these notions of 'complete' and 'incomplete' in terms of selectional features. Relating selectional features to projection is by no



means a new idea, as it is at the core of the so-called Relativized X' Theory influenced by categorial grammars, which claims (13):

- (13) Phrase structure composition is driven by feature discharge (from Fukui 2001:393)

In this respect, Collins (2002) uses the notion of saturation, which can be defined as follows:

- (14) A syntactic head is saturated when its selectional features have all been satisfied (adapted from Collins 2002).<sup>3</sup>

The proposal I would like to put forward is that only phrases whose head is saturated can function as sentence fragments. These correspond to heads with no selectional features and XPs in Government and Binding theory. Unsaturated heads (corresponding to X' projections in GB), however, can't function as such, as illustrated in (15) and (16):

- (15) - Who is coming?    - [DP The guy] (D is saturated)  
                                  - [DP That guy] (D is saturated)  
                                  - \*[D The] (no complement)  
                                  - \*[D That] (no complement)  
                                  - [D Him] (no selectional features)
- (16) - What will they do? - [TP They will fix it] (T is saturated)  
                                  - [VP Fix it] (V is saturated)  
                                  - \*[T, Will fix it] (no specifier)  
                                  - \*[V Fix] (no complement)  
                                  - [V sleep] (no selectional features)

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<sup>3</sup> For Collins (2002), the notion of saturation is important in determining the order in which heads are introduced in the syntactic derivation (cf. Locus Principle). Although this notion is not part of mainstream Minimalism, the idea of saturation and relating Merge to selectional features is useful for our understanding of the nature of Merge. Actually, research done in the so-called crash-proof framework (see e.g. Frampton and Gutmann 2002), clearly shows that restricting Merge in terms of selectional features is key in avoiding massive overgeneration.

If this proposal is on the right track, the reason why intermediate projections constituents cannot function as sentence fragments is that they are never complete in the sense just described. Notice, however, that this restriction also applies to unsaturated heads used in isolation (see for instance the  $*[_D \text{ that}]$  and  $*[_V \text{ fix}]$  examples above), which means that the restriction applying to  $X'$  constituents is not the result of  $X'$  Invisibility either, but rather the consequence of a *more general principle* governing which syntactic objects can function as sentence fragments.

By assuming all of the above, we can also provide a principled account for why non-projecting heads (i.e., heads with no selectional features) behave like maximal projections in terms of movement operations (in that they move to specifier positions):<sup>4</sup> a head with no selectional features is a non-projecting head, and non-projecting heads are, definition, maximal projections under Bare Phrase structure (see Chomsky 1995 for discussion).

#### 4. ELLIPSIS

As is well known, syntactic constituents can be elided under certain conditions. Ellipsis is usually possible with XPs and heads but not with  $X'$  constituents, a fact that has also been considered as evidence for the  $X'$  Invisibility principle.

For concreteness, let us center our discussion first on the  $XP/X'$  contrast, illustrated below:

(17) John says  $[_{TP} \text{ he } [_{T'} \text{ will } [_{VP} \text{ do it}]]]$  but I don't think he will <do it>

(18) \*John says  $[_{TP} \text{ he } [_{T'} \text{ will } [_{VP} \text{ do it}]]]$  but I don't think he <will do it>

It is generally assumed that ellipsis is possible in cases in which the elided element's features can be recovered under some sort of identity with previous linguistic material. In the above cases, for example, the VP

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<sup>4</sup> Notice that in a question like *who did you see?* the wh-element *who* can move to a specifier position even though it is a lexical item (a head, by definition). The fact that it is also a non-projecting head is what allows it to undergo (phrasal) wh-movement.

*do it* in (17) can be elided given that its features can be recovered from the identical VP *do it* in the first conjunct.

If this is the case, the question that immediately arises then is why the T' *will do it* in (18) cannot be elided in a similar way, since there is also an identical T' in the first conjunct in this sentence as well. I would like to compare here two possible explanations for this contrast:

- (i) The T' *will do it* cannot be elided because the node T' is not visible for an ellipsis operation.
- (ii) The T' *will do it* can in principle be elided, but the result is not acceptable because the T' cannot be recovered.

Explanation (i) relies, again, on the X' Invisibility Principle, which bars any syntactic operation that targets an X' constituent. Interestingly, however, most approaches assume that Ellipsis applies in the component of the grammar that deals with Phonological Form (PF) (see e.g., Merchant 2001; for a different approach, see Chung, Ladusaw and McCloskey 1995).

If this is correct, X' terms are invisible not only in the narrow syntax, but also in the PF component. This would suggest that X' terms do not count in terms of PF, for example, when determining prosodic phrasing. This seems unlikely, given that syntactic structure has been shown to be involved in determining the intonational contour of an utterance (see for instance Selkirk 1984, 1995 and Truckenbrodt 1999). Again, if X' terms are invisible, it does not just mean that they are not visible to a certain rule or constraint (Truckenbrodt's WRAP-XP constraint, for example), but it would *also* mean that a structure like [XP [Y ZP]] would be *equivalent* to a ternary structure [XP Y ZP], unless of course one *stipulates* that X' terms cannot be part of a constraint but are taken into account when determining how to apply that constraint (the sort of stipulation that is deemed undesirable in Minimalism). In this respect, it is interesting to note that the foundational articles of this important body of research show the syntactic trees, on which prosodic rules/constraints operate, as produced by the syntax, that is, including X' terms.

If X' terms actually count for operations applying in the PF component, then we would have to further stipulate that they are visible

to some operations (prosodic phrasing), but not to others (ellipsis). As can be seen, we now have a similar conceptual problem than the one that we encountered with respect to visibility in the narrow syntax (see section 1 above). This becomes even harder to maintain when we analyze the interaction between ellipsis and prosodic phrasing, since a sentence with ellipsis has a different intonational contour from its non-elliptical counterpart. Consider (19) for example:

- (19) John said he would not do it...
- a) ... but I think he will do it
  - b) ... but I think he'll do it
  - c) ... but I think he will <do it>
  - d) ... \*but I think he'll <do it>

As can be seen, in the non-ellipsis cases *will* can be contracted, and usually regular stress would fall on *do*, though not necessarily (*will* could be stressed as well). The ellipsis cases, however, require that *will* receive stress, hence the ungrammaticality of the contracted example (19c). This paradigm implies that intonation is assigned after the operation of ellipsis has applied. This would entail that X' terms that were invisible somehow become visible in the course of the PF derivation, certainly a derivational paradox.<sup>5</sup>

Here I would like to consider explanation (ii) and explore what property of X' terms might be incompatible with recovery of the elided material. I would like to treat recovery as a performance issue, which is the way it is understood in the so-called deletion approaches to null subjects, which explain certain important properties of null subjects in terms of their interpretation (see e.g. Cole 2000, Holmberg 2005 and Fernández-Salgueiro 2011).

Again, this approach would entail that X' terms are in principle licit targets for an ellipsis operation, that is, an operation that removes the

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<sup>5</sup> For reasons of space, I am not discussing linearization considerations. If we consider this more basic property of the syntax-PF mapping, it does seem that the asymmetry provided by the X' level is needed for the Linear Correspondence Axiom to apply; [XP [Y ZP]] is a linearizable structure but [XP Y ZP] (a ternary structure) is not. The reader is referred to e.g. Uriagereka (1999) for thorough discussion of these issues.

phonological features of a constituent in the PF component. It is when the elided features need to be recovered that the ellipsis is rendered unacceptable. I am going to propose that the possibility of recovery also relies on selectional features; ellipsis will be possible as long as the syntactic category of the elided material is selected by its sister head. Consider (17) (the good case) again, repeated here as (20):

- (20) John says [<sub>TP</sub> he [<sub>T'</sub> **Twill** [<sub>VP</sub> **do it**]]] but I don't think he **Twill** <**do it**>

In this case, the Tense head *will* selects a VP constituent. If my previous proposal about sentence fragments is correct, (20) has to contain a VP as part of its syntactic representation, albeit elided in the PF component, in order for the sentence to be grammatical. Since there is no overt VP in the same clause, the selectional features of the Tense head *will* initiate a search for a previous VP in the discourse (in this case *do it*) and its features are copied onto the VP slot predicted to exist in the syntax. The elided material is thus recovered and the ellipsis operation is acceptable.

Now consider (21) (= (18) above):

- (21) \*John says [<sub>TP</sub> **he** [<sub>T'</sub> [**will** [<sub>VP</sub> [**do it**]]]]] but I do not think **he** **T** <**will do it**>

In this case, the D head *he* crucially does not select for any T' constituent (as *he* is a head with no selectional features), which under this approach means that there is no evidence (overt or indirect) that there's a T' constituent in the syntactic representation. If this is the case, no recovery occurs, and the sentence is interpreted as *\*I don't think he*, which is obviously ungrammatical.

If this approach is correct, then, intermediate projections cannot be elided because no element's selectional features can provide the necessary evidence that the X' constituent is part of the syntactic representation and then trigger recovery of its features. An interesting debate that I would like to leave open here is whether a sentence like (8) is grammatical but perceived as unacceptable or it can actually be

characterized as ungrammatical. Discussing this issue in detail would lead as too far afield, as it would involve other phenomena besides ellipsis (for example, null subjects, as mentioned above).

It should also be noted that this is by no means the first analysis that does not rely on X' Invisibility. Lobeck (1995) and others have tried to predict which terms can be elided in terms of agreement. If this line of research is correct, a similar conclusion can be reached than the one I am reaching in this paper, as it also entails that X' Invisibility is not needed to account for restrictions on Ellipsis.

## **5. CONCLUSION**

In this paper I have tried to show that the X' Invisibility Principle is problematic on both conceptual and empirical grounds and I have argued that X' constituents are indeed visible for syntactic operations. The fact that X' constituents cannot be involved in certain operations can be explained by examining the properties of X' constituents and the conditions that those operations need to obey. Movement of X' constituents is barred by either the Extension Condition or the Chain Uniformity Condition, while selectional features are involved in determining which constituents can function as segment fragments and also which constituents can be recovered when ellipsis operations apply.

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*Gerardo Fernández-Salgueiro*

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*Gerardo Fernández-Salgueiro*  
*Department of English, Linguistics Section*  
*National Taiwan Normal University*  
*Taipei, Taiwan 116, ROC*  
*gfsayang@ntnu.edu.tw*



論 X' 不可見性的迷思: 分析句法投射中間層的限制

Gerardo Fernández-Salgueiro

國立臺灣師範大學

X' 不可見性原則」聲稱片語結構的中間層級是不可參與句法計算的(主要參考 Chomsky 1995)，支持這個原則的證據來自於 X' 組詞成分不允許句法移位、省略也不能被用來當作不完整句。在本篇文章中，我認為這樣的原則在概念上和經驗上皆是有問題的。我主張句法移位的限制可以用「擴張和鏈鎖一致性」輕易地說明，而省略和不完整句的限制則可以用選擇特徵和句法投射的本質來解釋。

關鍵字：X' 的不可見性、句法位移、省略、不完整句、投射、選擇特徵